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REPORT OF THE

Secretary of Agriculture

1946

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1946

WASHINGTON, SEPTEMBER 30, 1946

To the President

AMERICAN FOOD HELPING TO BUILD PEACE

The farmers of America have served the Nation's food wants as effectively in the first full year of peace as they did throughout the war. They have continued to provide abundantly for United States civilian and military requirements and for critical food needs abroad. Farm production for sale and for consumption in farm households will be about the same this year as it was last year; practically one-third greater than the prewar (1935–39) average. In terms of food alone, as distinguished from the total production for sale and for consumption on the farm, the 1946 output will be approximately 36 percent above the 1935–39 average. This production is a boon not only to the United States but to the world.

Even in prewar years the American farm output was tremendous; besides providing an American standard of nutrition much higher than for most other countries, it supplied large quantities of food and fibers for export. Against this background, the wartime and postwar increase is surprisingly large. Moreover, the farmers accomplished it with almost no increase in the land used for crops and pasture, and with a working force depleted 10 percent. Farm production has increased less during the last 5 years than industrial production; but industry has tremendously enlarged its plant capacity and its manpower. Farmers have boosted their output chiefly by doing more work and better work individually and by using more science and more machinery. They are forging vital weapons for the winning of the peace.

Leaders in the Government, in the military services, and in civilian life have unanimously extolled Agriculture's wartime contribution to the cause of the United Nations. They have repeatedly declared that American food was a basic source of both economic and military power. As a weapon, it ranked with guns, planes, ships, and tanks; it was vital both in the production and in the utilization of all these weapons.

Food power, in short, was fire power. But now we must recognize that the American farm is an equally efficacious instrument of peace. It is restoring the strength and the production of the liberated countries, continuing to assist our allies in the late war, notably the United Kingdom, and simplifying occupation tasks in ex-enemy lands. Without this food, we might have to double or treble the occupying forces.

It is the special virtue of food, moreover, that it does not have to be converted from wartime to peacetime forms. Food is always useful, just as it comes from the farm or from the food-processing plant. Unlike the bombing plane or the tank, food does not necessarily become surplus when the fighting stops. Peacetime food demands may differ somewhat in composition from those of wartime; but the change occasions little actual waste of supplies. Adaptation to it comes gradually, through shifts in crop patterns. Indeed, the immediate transition from war to peace may largely increase the demand for previously produced food, not only for relief purposes but for commercial trade released from war's restrictions. We have seen this year how eagerly the world has looked to American food for succor; and we have had proof that our response to the world's food need is helping to make sure we did not fight the war in vain.

Agriculture Buttresses Recovery at Home and Abroad

Food produced on American farms is simplifying problems of the transition from war to peace both at home and abroad. Our farmers were able to assure United States civilians in 1946 that they would have no less than 15 percent more food per capita than they consumed on the average in the years 1935–39. This was essential underpinning for full employment. In midsummer the Census Bureau reported total civilian employment in the United States at 57,960,000, an all-time record; moreover, the employment was at high wages, as shown by the fact that in June the index number for the income of industrial workers was 164 percent above the 1935–39 average. It would have been impossible to maintain this level of industrial employment in the absence of an adequate food supply. Shortage would have interfered with industrial operations and made employer-worker relations vastly more difficult.

American food is helping to solve transition problems abroad in a manner which I shall discuss in detail later. Here I wish simply to note that, after providing domestic supplies, it is making millions of tons of food exports possible. Our agricultural exports in the year ended June 30 last exceeded 16½ million long tons of foodstuffs and included no less than 400 million bushels of bread grains. The second half of calendar 1946 promises an almost equally impressive food-export total. Commercial as well as relief requirements entered into the export trade, though the bulk of the shipments went to war-devastated countries where starvation threatened. Our food exports were building stones for peace. The foundations of peace are now being laid. But if the world were still in famine, we should have a poor chance of laying them. Largely, the improving prospect of a stable peace is a measure of the extent to which this country has sent food abroad. We shall have to continue to send food. It is well, therefore, to bear in mind that relief and other export food serves the national interest as truly as food consumed at home.

Sources of the Expanded Farm Potential

Look at the sources of our enormously increased food potential. Primarily, they are technical. They show up in steadily increasing farm efficiency. Quietly and gradually, yet with prodigious cumulative effect, American agriculture has accomplished a technical revolution. Largely it has done so in less than a decade, though with processes of earlier origin. This revolution takes form in increased farm mechanization, in increased use of fertilizers, in the employment of improved crop varieties and livestock, in the widespread application of scientific pest controls, and in scientific soil conservation. Agriculture's technical progress has produced few novelties. It has developed nothing, for example, to set beside the atomic bomb. Nevertheless, its progress along many lines adds up to results equally significant and much happier in world implications. Moreover, the agricultural revolution continues. Provided we solve the problem of maintaining an adequate domestic and foreign market, it will continue to provide increased well-being.

One feature may be noticed in addition to the outstanding fact already mentioned; namely, that the increase in farm production has required almost no increase in crop acreage and has taken place despite a big reduction in the farm labor force. It is important to bear in mind that the increase owes comparatively little to good weather. Nature has favored American crops during recent years. Studies indicate, however, that this has accounted for only about one-fourth of the total increase in production. The remainder must be credited to increased individual farm effort, plus increased mechanization, the use of higher yielding crop varieties, greater use of fertilizer, and more widespread adoption of scientific farm practices generally. Moreover, this technical progress is one-way—it cannot go back. Total output for human use cannot be expected to fall much, except in years of extremely unfavorable weather. There is no road back from the agricultural revolution.

The Distribution of U. S. Food

Some of the facts already mentioned bear witness to the physical reality of this technical revolution. One or two more may cure the skepticism expressed by some consumers. When consumers cannot buy a beefsteak or a ham, they ask where all the production is. Statistics that have been checked and rechecked buttress the statement that civilian food consumption per capita was 10 percent above prewar level in 1944 and is now about 15 percent higher. Consumers who find this hard to reconcile with particular shortages, such as of beef, or butter, or fats and oils, should bear in mind that during and since the war the food consumption of the lower income groups has been higher than ever before. This is what, as a Nation, we want; but it also explains why, with exports dipping deep into the food pile, we do not always have enough of everything to go around. We now have a better average food distribution than ever before; but this inevitably means that ordinarily privileged consumers find their privilege diminished. Ultimately, of course, high production implies high consumption, though some of the consumption may take place abroad.

Nevertheless, even under the present conditions of high foreign demand for relief and other purposes, the great bulk of our farm pro-

duction goes into domestic consumption. Between 1935 and 1939, when our food production was considerably lower than it is now, civilian consumption in the United States accounted for 97.4 percent of the total food disappearance. Commercial exports and shipments accounted for the remaining 2.6 percent. In the peak war year, 1944, food disappearance on a quantity basis was much larger—specifically 37 percent larger. Even then, however, civilian consumption accounted for 80.3 percent of the food disappearance. The remainder went in the proportion of 12.7 percent to the United States military forces, and 7.7 percent in lend-lease and other exports and shipments. This year (1946) civilian consumption in the United States will account for about 89 percent of the total food disappearance. Our Military Establishment will take about 3 percent and exports and shipments will take the rest.

The Long-Time Problem

Briefly, we have no trouble at present with regard to the distribution of the enlarged farm output; in other words, agriculture's technical revolution has not as yet created any great surpluses. Current prices give evidence of that. Farm prices for the calendar year 1946 may average between 220 and 225 percent of the 1910-14 level; cash farm income may be nearly three times the 1935–39 average. Naturally, however, farmers cannot safely project current prices and incomes into the future; they must consider the long-time outlook. They can expect continued good prices and incomes only on the basis of an adequate demand for their total production, the part destined for export along with the part required for domestic consumption. Good consumer buying power at home will not suffice. How to establish and maintain desirable demand conditions both at home and abroad, so that the agricultural revolution may continue without producing a wave of surpluses, is of course a problem not for agriculture alone but for the Nation. Indeed, it is a problem for the world.

It is certain agricultural production in 1947 will continue well above prewar levels; this follows from the irreversible character of the upward trend in farm technology, which in the last decade has increased crop production per acre by one-fifth and production per farm worker by one-third. Happily, the demand for food products is likely to continue strong in 1947. In the domestic market this prospect rests on the still largely unsatisfied call for industrial products of all kinds, particularly automobile equipment, textile goods, housing, and house furnishings. Abroad, the prospect rests on the fact that in 1947 more and more foreigners will be in a position to pay for the food imports they require; already, the commercial overseas demand for American farm products is reflecting extensive economic revival. But we need to remember that eventually we could have farm surpluses once more. In fact the danger will continue until we learn how to make sure that consumers in this country will have the food dollars to buy what they need, and that consumers abroad will always be able to earn dollars.

Economic and Social Research Matching Technical Progress

Awareness of problems however, should not blind us to progress we are making in solving problems. The first year of peace furnishes many striking instances, such as the maintenance of full employment

with comparatively little interruption; the quick mobilization of farmers, processors, consumers, and others for world food relief operations; and the broadly successful handling of complicated wage- and price-adjustment problems. In 1946 American democracy has been very effectively in action at home and abroad. It has given evidence that side by side with its development of production techniques, it has created or improved techniques for handling economic and social problems. This is particularly true in the agricultural field, where the technical foundations laid during the last two decades for increases in production have had a counterpart in national programs for stabilizing prices, adjusting production to demand, safeguarding the soil, and disposing of surpluses in ways calculated to do good.

Agricultural research and service through Federal and State agencies will expand greatly in the near future under the Research and Marketing Service Act of 1946, which was approved in August. This measure, described in more detail later in this report, especially emphasizes research into methods of improving the marketing, handling, processing, storing, and distributing of farm products. Necessarily, the research will go into basic problems of demand and supply, as well as into problems connected with the improvement of distribution facilities. This is evident from the fact that the legislation also calls for study of the production and utilization of farm products. Other subjects to be covered include human nutrition, land utilization, and forest and water resources. In all these lines Federal and State agencies have conducted research for many years; but the increased provision now made for such studies should bring proportionately increased results. Moreover, it shows hope that scientific work like that which created the agricultural revolution can help solve the related economic and social problems.

THE WORLD FOOD CRISIS

After the war ended, the world food crisis faced this and other food-surplus countries with new demands upon their food supplies. Famine threatened whole continents; it was vital to halt the peril, not only for reasons of humanity, but as a means of building peace. This country responded energetically with an export contribution during the 12 months ended June 30, 1946, practically double the first estimate of requirements. Most Americans had hoped that the termination of the war would diminish the drain upon the American food supply and put an end to shortages of some items. Instead, the demand changed suddenly from livestock products to grain and for a short time bread became comparatively scarce. Farm operators thought they could restore their normal crop rotation, diminish their acreage of soil-depleting crops, and prepare in other ways for ordinary peacetime conditions. Actually, they faced another season of all-out production fully as exacting in its demands as those of the war years.

As the largest source of exportable foods, the United States became the largest supplier of relief foods. This responsibility imposed on farmers many changes in their crop and livestock balance, on processors many changes in their operations, and on consumers many adjustments in the composition of their diets. It involved acceptance of irksome food orders, of food priorities in transportation, of scarcities

in items that previously had not been scarce. But the compensation in substantial relief of the world food crisis was adequate. Mass hunger continued throughout vast areas but did not develop into the threatened mass starvation. Huge food exports, principally from the United States, tided the hungry millions over until 1946 crops came in.

In the year which ended June 30, 1946, the United States exported more than 16½ million long tons of foodstuff, chiefly to war-devastated countries where starvation threatened. It accepted a bread-grain commitment for this period of 400 million bushels. This was met in full. Specifically, exports of wheat and flour (10,333,000 tons), plus corn and corn products (407,000 tons), reached 402 million bushels. Approximately 5,549,000 tons of bread grains moved out from January 1 through June 30. Enough more was then on hand at ports to ensure fulfilment, with only a few days of grace, of the 6-month goal of 6 million tons. This brought the total to 417 million bushels, an excess of 17 million bushels above commitments.

Estimates in December 1945, when the Department accepted the 400-million-bushel commitment, indicated our wheat and flour exports in the second half of 1945 had totaled 175 million bushels. Accordingly, the remaining 225 million bushels (or 6 million long tons) became the January-June goal. Subsequently, complete records revealed that July-December exports had totaled 192 million bushels. Nevertheless, the Department allowed the goal of 225 million bushels to stand.

In addition to the above-mentioned bread grains, the United States exported rice, oats, rye, and barley. Total grain exports amounted to 11,792,000 long tons in the year ended June 30 last. Exports of dairy products in the same period totaled 760,000 tons, of meats 582,000 tons, and of fats and oils 356,000 tons. Other exports included dry peas and beans, potatoes and sweetpotatoes, fruits and vegetables, sugar, eggs, and dried fish. Shipments in this category made a total of more than 3,200,000 tons. Out of all the food distributed from United States supplies in 1945–46, 1 pound in every 8 went overseas to foreign countries. More than 40 percent of the wheat distributed as food was exported, more than 35 percent of the rice, more than 20 percent of the cheese, more than 10 percent of the fats and oils, and about 6 percent of the meat.

Hunger Only Partially Relieved

But millions were still hungry after this contribution had been made. The relief shipments, plus the 1946 harvests, gave only a breathing spell. Some areas had to stand further ration cuts in 1946, down to bare subsistence levels. Food-production conditions were better than in 1945 over most of the world; but food-crop acreage was still below prewar average, and shortages of fertilizer and other essentials tended to restrict the yields. If the harvests, not yet fully in at this writing, fulfill the promise of the summer, the world's food output will exceed the low production of 1945. Yet it will not be equal to the prewar average, particularly on a per capita basis; moreover, preharvest stocks will be extremely low. Total world supplies of food products for the 1946–47 crop year cannot much surpass those of the previous year and cannot warrant much decline in total world relief shipments.

Privation will continue at least until the harvests of 1947 and can be expected to be accompanied by high death and disease rates, especially among children and old people. Wheat exports from North America during 1946–47 may not exceed 75 percent of the 1945–46 total. Wheat shipments from all countries combined may fall below those of the preceding year, even if yields average considerably higher than those of 1945. Hence, continued effort on the part of the food-surplus countries may be necessary to minimize their consumption of cereals and of fats and oils. An International Emergency Food Council, formed to gather food facts and recommend allocations and division of supplies, will promote effective cooperation.

Although the time has not yet come to relax, the relief job is well along, and we can well afford to measure how far we have advanced. Accordingly, this report will analyze the causes of the world food crisis and will describe the steps taken to meet it.

Problem After VJ-Day

It was evident before the war ended that liberated and ex-enemy countries would be short of food, but the stated requirements submitted by claimants at that time were considerably less than requirements submitted a few months later. Many items were then in fairly ample supply. Termination of the war was expected to give foreign agriculture a chance to recoup, subject to limitations of facilities. Military requirements at the end of the war dropped considerably—ours from about 10 percent of total United States production to less than 5 percent. It seemed possible, moreover, that United States reconversion problems would reduce income payments sufficiently to affect civilian food buying. Expected cut-backs in requirements seemed likely to leave this country with sufficient food to meet both domestic and foreign demand. But this outlook proved to be far too optimistic.

Military requirements exceeded expectations because much food had to be provided for the feeding of occupation forces, civilians in occupied zones, war prisoners and liberated and ex-enemy people near recent battle fronts. The requirements of many deficit countries increased, partly because of drought, partly because of too rapid consumption of food reserves. Some liberated countries temporarily used excessive quantities of grain for livestock feed. This was an understandable error; termination of the war raised hopes of livestock rehabilitation, in addition to hopes of larger food supplies. But the mistake added to the total relief-food needs and aggravated local shortages, black marketing, and other distribution problems. When detailed information became available with regard to the extent of the 1945 droughts, estimates of available supplies dropped heavily from those made in early summer.

In the United States, farmers had maintained their food production at nearly the wartime peak. Their wartime accomplishment, achieved despite shortages of labor, materials, supplies, storage space, and transportation, gave this country the best fed army and navy in recorded history, the best fed civilian population, and the top position as supplier of foods to allied and friendly countries. Our food production in 1944 was 38 percent above the 1935–38 average, despite

production handicaps, and 1945 was another good year. Though we began 1946 without substantial food reserves, we had no serious shortages. Civilian consumption, relief shipments, and commercial shipments were rising, but we still had ample supplies for domestic needs.

Civilian consumption in the United States promised, when the year began, to hold at about the wartime peak, or at least 10 percent per capita above prewar level. Later figures showed the first estimate was too conservative. Consumers would have purchased more of some items such as fats and oils, certain dairy products, and meats. But food consumption per capita was averaging about 3,300 calories daily, as compared with less than 1,000 in some war-torn lands. Our food supply assured a nutritive value equal to that of the war years; it was higher for every nutrient than before the war. Other foods compensated for scarce items sufficiently to prevent any serious reduction in protein, thiamine, and niacin values. Large milk consumption assured well-maintained calcium and riboflavin averages. In short the Nation's protective food supply was adequate in quantity and quality. The composition had changed a little, but not harmfully.

Exports at Beginning of 1946

When 1946 began, we were already exporting large quantities of food in response to requests by the armed forces, by United Nations Rehabilitation Relief Administration, and by paying countries. Military overseas requisitions, after a temporary drop, were rising again. Wheat exports through UNRRA were heavy although still far below their peak, and takings by the paying countries were far above their prewar wheat imports from the United States.

By January 1, UNRRA had been assured of a total United States contribution of $2,700,000,000, of which $2,160,000,000 has been appropriated. Thus financed, UNRRA was arranging shipments far above the 1945 level. In December, agricultural exports to UNRRA countries exceeded 63 million dollars in value. UNRRA was also purchasing United States Army supplies abroad for use in relief operations. Soon the outflow became a torrent, with the result that even in the first quarter of 1946 our food exports were at the rate of 16 percent of the total available United States food supply, compared with 5 to 7 percent in the war years 1942–44 and only about 3 percent of the smaller prewar food total. Liberated and occupied countries together in the January–March period were absorbing United States food at the rate of about 11 percent of the available American supply.

A Nation-wide warning regarding prospective world food shortages came from the President on his return from Potsdam in August 1945. In October this Department reported that the 1945–46 world output of food on a per capita basis would be as much as 10 percent below the prewar average, and that shortages would be very unequally distributed by countries. Later reports, reflecting greater drought damage, placed the estimated world reduction on a per capita basis at 12 percent below prewar average, with the reduction running to 50 percent in North Africa and 25 percent in Europe. Even in normally food-surplus countries such as Argentina and Australia, food supplies were drastically reduced. It was evident in 1945 that liberated and ex-enemy countries would require substantial food imports, though the great extent of the need was not then fully apparent. In February the Presi-

dent announced a nine-point program. This program, the announcement said, would inconvenience consumers, food trades and industries, and transportation systems; but the inconvenience would be a small price to pay for saving lives, mitigating suffering, and helping to establish peace.

Nine-Point Program

Following were the nine points: (1) Campaign to conserve food, especially bread; (2) disuse of wheat and restricted use of other grains for alcohol and beer; (3) extraction of more flour from wheat, and restriction of flour distribution; (4) control over inventories of wheat and flour; (5) rail priorities for wheat, corn, meat, and other essential foods; (6) control over exports of wheat and flour; (7) exports of 365,000 tons of fats and oils, 1.6 billion pounds of meat, and increased exports of dairy products particularly cheese and evaporated milk during 1946; (8) provision of more ships to move food exports and bring in Philippine copra for cocoanut oil; (9) conservation of grain in the feeding of livestock.

The President appointed a Famine Emergency Committee, with former President Herbert C. Hoover as the honorary chairman and Chester C. Davis as chairman. On this Committee's recommendation he also appointed a National Famine Emergency Council of about 12 members. Administrative responsibility for carrying out this program devolved upon the USDA, which appointed State managers and county managers throughout the country, and in Washington established an Office of Emergency Food Programs.

High Farm Goals

Already, this Department had recommended high farm production goals for 1946. They called for 356 million acres of crops, 5[illegible] acres above the planted 1945 acreage. The proposed livestock were nearly the same as those of 1945 except for poultry and dairy products. Suggested originally in November 1945, the goals were revised upward in January 1946, so as to increase the recommended total cultivated crop acreage by about 1 million, and adjust the goals to feed resources.

Expected to be final, the January goals requested 357,720,000 acres. More than 296 million acres represented cultivated crops. Acreage for the most urgently needed crops, such as rice, dry beans, sugar beets, and flaxseed were well above the original recommendations, and small increases were recommended for barley and sorghums. Placed at the 1945 acreage, the wheat goal looked toward another big wheat crop; the rye-acreage goal for harvesting as grain was 30 percent above the 1945 harvested rye acreage; and the rice goal, though slightly below the 1945 average, was well above the 1937–41 average. The sugar-beet goal, near the estimated maximum capacity, called for an increase of 32 percent over the 1945 planted acreage.

Contrary to the usual practice, the goals revision had to be extended into February, to allow for mounting requirements. Additional increases requested then included 1,000,000 acres of spring wheat; 1,000,000 acres of corn in the Corn Belt; greater acreages of corn and grain sorghums in other areas; 1,110,000 acres of soybeans; and 100,000 acres of smooth dry edible peas. Larger grain, oil, and protein crops

aimed at the main weak spots in the food situation. Also, the Department asked farmers to market beef cattle at or above the goal levels, to market heavy hogs promptly, and to finish hogs and cattle to lighter weights. It reaffirmed the reduced turkey goal and suggested a reduction in broiler production.

Compliance with these requests was bound to hamper farm reconversion, particularly the belated return shift of acreage from soil-depleting to soil-conserving crops such as grasses, legumes, and pastures. But continued all-out production was essential; it was the only alternative to inaction in the face of world disaster. Urging farmers to make every possible effort to achieve the goals, the Department recommended as much attention as possible to soil conservation and the restoration of rotations and desirable crop patterns. The expanded goals, together with the request for greater emphasis on food crops and less on livestock, set new problems for all our farmers.

Procurement and Distribution

Simultaneously, the Department reexamined its procurement and distribution programs. It issued various orders which reinstated protein meal set-asides, limited the use of grain for industrial and beverage alcohol, increased the wheat extraction rate for flour, restricted the use of wheat in mixed-feed production and inventories, and restricted the sale and use of wheat mill feeds. Set-asides on beef, veal, and mutton, which had been suspended on September 2, 1945, and reinstituted on October 14, helped the meat-export movement. The Department reinstituted and increased the pork set-aside. Also, by broadening the set-aside coverage to include non-federally-inspected plants certified as sanitary and by decreasing the number of exempt States it increased the other meat set-asides. In line with the policy of conserving feed, the Department announced that on June 30 the subsidy of 50 cents per pound to cattle feeders would be terminated. This subsidy had encouraged the feeding of grain to cattle and the feeding of cattle to heavier market weights. In the famine-emergency situation the opposite policy became desirable.

Summation of the Crisis Work

Thus 1946 did not find us unprepared. Organization, science, and effort on farms had placed us in a strong food position domestically, with power to boost our exports quickly. This was evident at once. Exports of agricultural commodities in the January–March quarter exceeded 846 million dollars in value, and were 69 percent greater than in the first quarter of 1945. Meantime, farmers were ready for another high-production drive, through cooperatively planned crop adjustments and acreage increases, State by State and farm by farm. This Department too was ready for emergency service. Using machinery created or developed during the war years, it effectively encouraged continued all-out production, ascertained world food needs, and procured and allocated food supplies.

Maintaining close cooperative relationships with farmers, processors, distributors, and transportation companies, with the armed forces, with UNRRA, with the Combined Food Board, and with official representatives of claimant countries as well as other supplying countries,

the Department played a large and perhaps decisive role in meeting the crisis. As the year advanced, and the financial and other preliminary work fell into place, the cooperative system improved. Notably, it benefited through contacts, discussion, and study of conflicting viewpoints. This Department had legislative authority to estimate food requirements, recommend crop goals, maintain price-supports, allocate food supplies, and implement procurement decisions; but these powers, if exercised arbitrarily, might not have produced the desired results. Hence the procedure both with farmers and processors and with governmental agencies here and abroad emphasized agreement and good will. On that basis, substantial success was achieved in the first great postwar food test.

Scope of the Team Play

Needless to say, the American response to the world food crisis involved a combined effort by innumerable interests and agencies. It involved the entire economy. Few economic groups or governmental agencies could say they had no role to play. Famine relief influenced farming, manufacturing, commerce, transportation, and finance; it affected export and import trade, transportation by land and sea, commercial as well as governmental trade facilities and credits. All this, of course, is evident; mention of it would not be necessary but for the habit of treating food problems as largely agricultural. Farmers themselves do not make this mistake; they know their own contribution is just part of the food job. But farmers and agricultural officials may draw attention to the fact, evident from the 1946 record, that they did their part well. Now the country can look forward to the next phase—that of assisting needy countries to become independent of relief food.

WHEAT IN FAMINE RELIEF

As a famine-relief food, wheat was especially important. Wheat was not the only food this and other surplus-food countries were sending abroad; the shipments also included coarse grains, fats, beans and peas, rice, dried fruit, sugar, meats, eggs, and dairy products. Nevertheless, wheat was the principal requirement. This was because wheat could be shipped, stored, and rationed more readily and in larger quantities than any other food that would support life. Moreover, wheat was central in the famine-relief situation for another reason. With other foods also very short of meeting the demand, it was convenient to express the deficient calorie requirement in terms of wheat equivalent. Consequently, the estimated wheat requirements reflected not only the demand for wheat as such, but also the demand for unobtainable other foods.

Large wheat exports from the United States took place in the last half of 1945. In that period we exported about 200 million bushels, or nearly five times our average export in the 1932–41 prewar years. This 200 million bushel total for the second half of 1945 was the export volume for all purposes—to all parts of the world. In 1946 the requirements came more predominantly from the relief countries. Because our wheat stocks, mostly located far from the seaboard, were declining rapidly and because the other wheat-surplus countries were

likewise approaching the end of their wheat reserves, the relief demand presented an extremely difficult problem. There was no possibility of meeting it in full. So great, in fact, was the spread between the world wheat supplies and the world wheat requirements, that the differential provided a sort of famine barometer, on which attention centered throughout the world. Every available bushel was in demand and the pressure of the emergency necessitated extreme measures to conserve, collect, and ship this vital bread grain.

It will be convenient, as a way of sizing up the situation, to look at it first of all in terms of the 12-month period—July 1, 1945, to June 30, 1946. About the turn of the year, surveys had assembled a mass of information about the war damage suffered by agriculture in many countries, about the drought losses that took place in 1945 in Europe, Africa, Australia, and parts of Latin America, and about the mounting food deficits of many Oriental countries. Also available at that time were more precise indications about available world food supplies. These included facts with regard to shortages of seed, machinery, fertilizer, and draft power, light on grain collections, and information about other distribution problems. It appeared that minimum world wheat-import requirements for the 12 months—July 1, 1945, to June 30, 1946—would approximate 1,200 million bushels.

The requirement for the July–December period had been largely met; this totaled about 470 million bushels. It was evident, however, that meeting the estimated requirement for the January–June period would be far more difficult. Estimated at 725 million bushels, the total for this period seemed likely to be not more than 60 percent filled. In fact, even this percentage of fulfillment was sure to put a strain on the wheat resources of the surplus countries. Only the most strenuous conservation and collection program could give any hope at all of coming appreciably nearer to the estimated 725 million requirement. In looking beyond the 12-month period above-mentioned, it seemed probable the world's wheat-import requirements would continue to be high during the rest of 1946.

Continuation of Needs Indicated

Some lessening of the demand was in prospect following the 1946 harvests, which in many countries promised to be much better than those of 1945. World food surveys showed, however, that the crisis in many countries would not be terminated with the coming harvest. In many war-torn countries, agriculture was seriously short of production facilities, and several years would be required before normal production was again achieved. As a result, the wheat-exporting countries were likely to be under considerable pressure in 1946–47 and will be called upon for above-average supplies in the years immediately following. In the United States, the wheat program for 1946–47 calls for a continued large acreage in 1947 for the purpose not only of taking care of urgent needs abroad but also of making possible the replenishment of stocks, which in 1946 fell to seriously low levels.

The four principal overseas wheat exporting countries are the United States, Canada, Argentina, and Australia. Wheat stocks in these countries for July 1, 1946, were down to about 373 million bushels, the smallest total since 1938. This figure may be compared with the all-time high—1,740 million bushels—which the same four

countries had in stock only three years earlier. In the early years of the war, wheat tended to pile up in the four exporting countries. It was not then the most urgently required world food, and shipping difficulties interfered with the exports.

Between 1943 and 1946, however, the stocks declined. In the United States, heavy use of wheat for livestock feeding and for the production of industrial alcohol drew upon the reserves. In Argentina much wheat deteriorated in storage and some wheat had even to be used for fuel. In 1944 and 1945, droughts curtailed wheat production seriously in the Southern Hemisphere; in the latter year wheat exports from all the exporting countries increased.

As mentioned, the combined stocks of the four principal wheat-exporting countries are now less than in 1938. They are even below the 1935–39 average, though in that period our own supplies declined heavily from unprecedented drought. Our own wheat stocks on July 1, 1946, were the lowest in 20 years, except for 1937.

Exports of wheat and flour in the year ended June 30, 1946, are estimated to have reached 387 million bushels. Shipments to United States possessions amounted to 4 million. Shipments of corn and corn products exported against wheat commitments amounted to 17 million. These shipments together totaled just 408 million bushels, and met the commitment for the 12-month period. The corn involved had been acquired under the corn "bonus" plan.

Requirements and Shipments

Preliminary claims against United States supplies early last summer indicated a probable need to export about 225 million bushels during the 1945–46 marketing year. By late summer, these estimates were revised upward to 250 million bushels. During the fall and early winter, UNRRA and France and a number of other countries raised their estimates of minimum needs several times. Finally in December, as a result of requests then being made and the outlook for supplies from other sources, the United States agreed to undertake the export of a record total of 400 million bushels during the year. At the time, advance estimates placed wheat and flour exports, including military relief, at 175 million bushels for the last 6 months of 1945. To bring the total commitments for the year to the 400 million-bushel level, a goal of 225 million bushels was set for the January–June 1946 period.

Later but still preliminary reports showed that 192 million bushels of wheat and flour were shipped before January 1, leaving only 208 million to reach the 400 total. Because of the tremendous need, however, the 225 million goal for the January–June period was retained. Enough wheat, flour, corn and corn products were at ports on July 1, ready for loading on ships to bring the total above the goal. These exports had left our shores by the middle of July.

Of the total wheat exports, estimated at 387 million bushels, 271 million bushels were in the form of wheat and 116 million bushels in the form of flour. Of these quantities, 45 million bushels of wheat and 36 million bushels wheat equivalent in flour were for military relief; 71 million bushels of wheat and 15 million bushels wheat equivalent in flour went to UNRRA countries. Wheat milled in bond, about 13 million bushels, is not included in these figures.

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With imports in 1945–46 of about 2 million bushels, net exports, including shipments to possessions, are just short of 400 million bushels, an all-time record. The previous record net figure for a single year was 335 million bushels in 1914–15. During the five prewar years, 1935–39, the average was only 42 million bushels. A substantial part of the imports in 1945–46, which occurred early in the season, consisted of the last of CCC imports under the program to furnish wheat for feed.

Grain Conservation Procedures

Obviously, continued unrestricted use of wheat for food, feed and industrial purposes would have caused this country to fall far short of its export goal. Measures which were taken to increase our exportable supply included both obligatory and voluntary reductions in the use of wheat. By an order effective March 1, the Government required millers to produce only flour of an 80-percent extraction. In addition, the Government restricted the use of wheat by feed manufacturers and prohibited the use of wheat in making alcohol and beverages.

Moreover, beginning April 1, it ordered a restriction of flour milling for domestic use to 75 percent of the quantity distributed in corresponding months of 1945. Simultaneously, wheat food manufacturers were restricted to 75 percent of the quantity of wheat they had used in corresponding months a year earlier.

Effective May 1, a regulation limited millers and food manufacturers to 21 days inventory of wheat. Many mills exhausted their wheat supply in May and June, with resulting curtailment in wheat food consumption. Appeals through the famine emergency committee asked individual consumers to use less wheat, and some voluntary conservation took place.

Total savings in wheat consumption from obligatory and voluntary actions combined for the January–June period are estimated to have amounted to at least 40 million bushels. In the same period, the orders with regard to feed-wheat use and alcohol production saved probably another 35 million bushels.

It was important to accelerate the collection of wheat for export purposes. Accordingly, effective April 2, this Department offered to buy wheat from farmers for immediate delivery up to July 1, and to pay for this wheat at the market price prevailing on any later date on or before March 31, 1947, which the seller might select.

Furthermore, on April 19, the Department announced it would pay a bonus of 30 cents a bushel above the market price on all wheat delivered under the certificate plan by May 25, 1946. To be eligible for this bonus a producer had to select a date for payment between the date of delivery and June 15, 1946. By an order effective May 4, ceiling prices for wheat were increased 3 cents a bushel; this was done to keep wheat prices in conformity with legal parity requirements. Effective May 13, the wheat price ceiling was raised another 15 cents a bushel and increases were announced simultaneously in the price ceiling of other grains. The changes in the wheat price ceilings were, of course, independent of the 30-cent bonus arrangement. About 85 million bushels were acquired for export by the CCC.

Changes in Price Ceilings

Announced jointly by the Office of Economic Stabilization, the Department of Agriculture, and the Office of Price Administration, the May 13 change in the wheat price ceiling had the following stated purposes: (1) To remove uncertainty concerning grain price ceilings between that date and June 30, 1947; (2) to encourage the movement of grain for shipment abroad, for human consumption in the United States, and for essential livestock feeding in deficit-grain-production areas; and (3) to discourage feeding of livestock to heavyweights and bring about the proper balance between livestock numbers and grain supplies available for feed.

It will be recalled that during the war years an urgent need for livestock products necessitated an increase in United States livestock numbers to record levels, along with heavy feeding of grain to livestock. This necessity obliged agriculture to go deeply into the feed-grain reserve. This was very large when the war began, and in the war years we had bumper feed-grain crops. Nevertheless, we came out of the war with feed-grain reserves heavily depleted. In this situation, the use of wheat in livestock feeding increased. Simultaneously, other grains capable of being used as human foodstuffs went heavily into the production of livestock. The postwar situation required a different procedure. Specifically, it called for a substantial shift away from the use of grain in livestock feeding toward the increased use of grain for human consumption. This objective was promoted by the above-mentioned grain-use regulations and by the announced changes in grain price ceilings.

Program for 1946–47

In view of the virtual certainty that world wheat import requirements will be large throughout the 1946–47 marketing year, the Department as early as May tentatively sketched out a wheat-export program for that period. This program allows for the fact that 1946 wheat production in most importing countries will exceed that of 1945 but recognizes the obstacles to fully normal world wheat production. It also recognizes that the large reserve carry-over stocks in exporting countries at the beginning of the 1945–46 year had been exhausted. On the basis of a billion-bushel crop, which was indicated at the time, the Department of Agriculture on May 14 announced that our Government hoped to export 250 million bushels from the 1946 wheat crop.

At the time it appeared that such an export goal would require continued milling-extraction regulations, continued limitation of distribution of flour for domestic consumption, continued limitation in the use of wheat by feed manufacturers, continued prohibition of the use of wheat in the manufacture of beer and alcohol, continued voluntary wheat conservation, and continued set-asides of wheat for Government purchase.

As the season advanced, the wheat crop improved substantially, likewise the corn crop. In August the wheat crop was indicated at 1,160 million bushels—above the 1945 record production by 37 million bushels. While the world food needs were not definitely determinable

then, it appeared possible to relax our wheat restrictions so as to restore the normal milling rate, effective September 1.

It was estimated that this action would result in a food use of wheat in the year beginning July 1, 1946, of about 475 million bushels. With the other uses this would mean a total domestic disappearance of about 710 million bushels. Supplies available for export and carry-over would be about 550 million bushels. On the assumption that exports might total about 275 million bushels including 15 to 20 million bushels from the 1945 crop, the carry-over July 1, 1947, would be about 275 million bushels.

Wheat prices in the spring of 1946 were at the highest levels in a quarter of a century. Prices advanced from 5 to 10 percent after the lapse of price controls on June 30. Most of the advance however was soon lost. By action of the Decontrol Board on August 20, wheat prices continued free of ceilings. Set-aside provisions on wheat were suspended at the time of the abandonment of the ceilings.

Wheat prices in 1946 reflected a very large export demand; but this may now have passed the peak. Future exports will depend on the use of wheat in food-deficit countries, and on the level of international trade. Our wheat-pricing policy after the world shortages are overcome also will be important in determining our share of wheat exports. World wheat exports must remain at a high level, or large surpluses will again accumulate in this and other exporting countries.

If the United States wheat exports drop to a low level, price-supporting loans may again become effective. Present legislation provides for such loans to cooperating farmers at 90 percent of parity on wheat harvested during the 2 years following the year in which the cessation of hostilities is officially proclaimed.

POTATOES IN THE WORLD FOOD PATTERN

Especially worth noting, as evidence of the complex nature of the world food crisis, is the fact that we could not dispose as food of all our potato production, though potatoes are among the best of foods. Moreover, they enter heavily into the normal diet of war-torn countries. Needless to say, however, fresh potatoes are difficult to ship long distances, especially by sea; too often they arrive spoiled. Of course, potatoes may be preserved through canning and dehydrating. Canned potatoes are costly to produce and expensive to ship and, therefore, impractical for relief feeding. Dehydrated potatoes are also costly to produce but relatively inexpensive to ship. Even so, their lack of appeal to consumers makes them impractical for extensive relief feeding.

This year we again have a crop of potatoes above what the United States requires for food, seed, starch, and other domestic purposes. It is a near-record crop, and we face the probability of large potato production next year. As estimated in September, the 1946 output will be about 455 million bushels; that of last year was 425 million. Our 1946 crop is the output, moreover, of an acreage slightly below the average; but it reflects the general recent trend of shifts in the commercial potato-enterprise from low-yielding areas. In addition, it reflects the influence of improved cultural practices and of generally favorable weather. Supplies are in excess of demand at support

price levels, just as they were last year, and leave another substantial surplus for disposal in other than the usual market channels.

In the year ended June 30, 1946, with plentiful supplies of potatoes available, United States civilians consumed about 127 pounds of potatoes per capita. This was 4 pounds less than the prewar average of 131 pounds. Evidently, the trouble did not lie in any shortage of consumer-buying power. On the contrary the slight reduction in potato consumption per capita undoubtedly reflected a general desire and a general ability to place additional emphasis on other items in the diet. This has been the tendency for nearly 50 years. Probably civilian consumption from the 1946 crop will be not much different. If the full production is to enter sufficiently into distribution and consumption, special programs will be necessary, as they were in the marketing year 1945–46.

In August 1945 prices received by potato growers threatened to fall below support levels—90 percent of parity. Heavy movements took place in that month from the intermediate and from some of the late potato States. Accordingly, this Department made purchases to support the farmers' prices. Through December 1, 1945, these purchases amounted to more than 9,000 cars or about 6 million bushels. Most of the potatoes were not suitable for storing any length of time, and had to be disposed of immediately. Quantities were diverted into stock feed, into canning, into the manufacture of starch and alcohol, and into domestic relief distribution. Some went abroad.

Purchase of potatoes by the Government continued throughout the winter and the spring, but on a smaller scale. In that period the demand strengthened and prices tended to rise above support levels. Canada, whose own supply was short, imported the unusual quantity of more than 7 million bushels of United States potatoes, and France and Belgium unexpectedly took 3 million bushels. But this relatively favorable price interim was brief. As soon as the market movement of early 1946 potatoes reached its peak, which was in the last week of May, prices once more threatened to drop below the support levels.

It was consequently necessary for the Government to enter the market again. By mid-September it had purchased about 33 million bushels, and had diverted the major part of them into the manufacture of alcohol. Further Government purchase and diversion of 1946 potatoes will depend in part on the outturn in the late States. However, continued heavy support operations seem certain; these will consist mainly of loans on the late crop. Potatoes tendered in payment of loans will have to be diverted mostly from the usual trade channels.

This is not the most desirable utilization of a food crop. With critical food shortages continuing, the diversion of good potatoes from food uses to lower uses is unfortunate. It is particularly regrettable, though sometimes unavoidable, that some potatoes should be lost. Surplus potatoes from the early and intermediate crops are not suitable for extended storage or for general shipment abroad, and are consequently available only in part for food use in needy countries. Some losses of potatoes resulted last winter in Minnesota and North Dakota from bad weather plus a Nation-wide shortage of refrigerator cars. Bad weather in July 1946 caused some loss of potatoes in the Carolinas.

Substantial movements of potatoes to deficit food areas abroad, in either the fresh or the processed form, would involve much expense. Undoubtedly, this would exceed what a normal or free market could bear. Subsidies in one form or another would be necessary; these would have to be devoted exclusively to the shipment abroad of fresh or of canned and dehydrated potatoes, since the domestic market is well supplied. This raises questions with regard to the most advantageous use of relief and other funds, the analysis of which would carry me beyond my present purpose. But when we have foods that hungry countries want, we should ship them if possible.

CAUSES OF THE WORLD FOOD CRISIS

It is essential to recognize the causes of the world food crisis. The decline in the world's food production is attributable partly to direct effects of the war, and partly to devastating droughts during 1945 in Southern Hemisphere food-surplus countries, in the Mediterranean and Danube Basins, and this year in India. Severe damage to transportation and processing facilities, disruption of administrative mechanisms and controls, and paralysis of general economies in food-deficit countries were contributing causes. Farmers in many deficit areas were often unwilling to deliver food to the market, because they could get nothing more tangible in exchange than paper currencies of uncertain value.

Specially important in the crisis were the positions of the cereals (wheat and rice) and of fats and oils. An extraordinary demand for these foods arose in the deficit countries. Immediately before World War II the international movement of wheat and flour averaged less than 500 million bushels a year. This crop year (1945–46) it approached 900 million bushels. With other cereals for human consumption included, such as corn, rye, oats, and barley, the world trade in food cereals other than rice set a new record. The United States supplied approximately 40 percent of the wheat export total, as compared with the prewar 10 or 15 percent.

As mentioned, much of the food reduction, especially in central and western Europe, came directly from the war; it resulted from military damage and from shortages of fertilizers, machinery, and manpower, combined with lack of incentive goods for farmers. Farmers planted somewhat smaller crop acreages in 1945 than in prewar years (table 1). Yields were less than would have been obtainable had production supplies, especially phosphate fertilizers, been larger. Eastern Europe, formerly an important source of cereals for central and western Europe, suffered from population shifts, land reforms, and generally chaotic economic and social conditions. Surplus-rice-producing countries of southeastern Asia, themselves much harmed by wartime operations, could not furnish any substantial supplies to India and China. Outstanding among factors in the 1945 world food reduction, however, were the droughts.

These started in the spring in North Africa, extended through all the Mediterranean countries, and affected the Danube Basin. Some areas along the Atlantic coast of Europe suffered. In prewar years North Africa supplied something like ½ million tons of wheat a year to continental Europe. This normally export region in 1945–46

became an import region, with an indicated need for wheat imports of nearly 2 million tons. Its temporary shift to a deficit position added something like 100 million bushels to the stated wheat import requirements of Europe and adjacent areas. Large import requirements developed in the Danube Basin, which before and during the war supplied food grains to central and western Europe. Population changes and land reforms, along with occupation by foreign troops combined with the droughts to convert countries of the Danube Basin and eastern Europe into a region with a deficit of at least 750,000 short tons of grain.

TABLE 1.—*Wheat: Area, production, and yield per acre in Europe and North Africa, average 1935–39 and annually 1940–45*

Year	Europe			French North Africa		
	Area	Production	Yield per acre	Area	Production	Yield per acre
	1,000 acres	*1,000 bushels*	*Bushels*	*1,000 acres*	*1,000 bushels*	*Bushels*
Average 1935–39	78, 152	1, 626, 000	20. 8	9, 353	73, 364	7. 8
1940	73, 000	1, 300, 000	17. 8	9, 709	58, 296	6. 0
1941	74, 200	1, 425, 000	19. 2	11, 926	92, 250	7. 7
1942	70, 400	1, 360, 000	19. 3	11, 745	64, 464	5. 5
1943	75, 400	1, 510, 000	20. 0	8, 924	60, 587	6. 8
1944	71, 300	1, 475, 000	20. 7	7, 993	51, 184	6. 4
1945	61, 800	1, 035, 000	16. 7	7, 421	23, 122	3. 1

Office of Foreign Agricultural Relations.

Moreover, some of the western European countries, particularly France, relaxed their rationing and other controls on cereals distribution early after their liberation. They consumed supplies of domestic wheat disproportionately in the early months of the 1945–46 season. Because of their difficulty in importing meat and fats, they made a considerable feed use of domestic grains, with a resulting intensified need for overseas wheat.

Rice in the World Food Shortage

Significant among the causes of the food crisis was the world rice situation. World rice crop in 1945–46 was only about 18,000,000 tons, nearly 20 percent below prewar average. About 8,000,000 tons annually entered international trade in prewar years, about 90 percent of it from the three great rice-surplus-producing countries, Burma, French Indochina, and Siam. In 1946 not more than 2,000,000 tons was available for export from all sources. Ordinarily, India and China depend upon Burma, French Indochina, and Siam for large quantities of rice. Temporarily, these sources almost dried up. In consequence, India, China, and also Japan looked toward the wheat-exporting countries for essential foods.

Only four countries normally have large quantities of wheat for export—the United States, Canada, Argentina, and Australia. Both the United States and Canada maintained their wheat production in

1945 at high levels—in the United States at a record level. Considerable piling-up of supplies occurred in both countries during the war. Much United States wheat went into the manufacture of industrial alcohol and into the feeding of livestock. Our principal allies, the United Kingdom and Russia, were then looking to the United States chiefly for animal proteins such as meat, cheese, and dried eggs.

At the beginning of the 1945–46 season the United States had a larger carry-over of wheat than in any 1 of the 6 years that immediately preceded the war. The total supply, crop plus carry-over, totaled 1,406,000,000 bushels, larger than any annual supply prior to 1942–43. But in Argentina and Australia the wheat-supply situation was not good. Production in both countries had declined from drought and both had the smallest wheat supply in many years. Supplies marketed in 1946 by Argentina and Australia were substantially below prewar. See table 2.

TABLE 2.—*Wheat: Area,*[1] *production, and yield in principal exporting countries, average 1935–39 and annually 1940–45*

Year	Argentina	Australia	Canada	United States
	Area [1] 1,000 acres			
Average 1935–39	18, 663	13, 128	25, 595	73, 236
1940	17, 507	12, 645	28, 726	61, 610
1941	18, 038	12, 003	21, 882	62, 332
1942	16, 983	9, 280	21, 586	52, 227
1943	16, 830	7, 860	16, 850	55, 127
1944	15, 401	8, 429	23, 284	65, 439
1945	13, 787	11, 100	23, 414	68, 781
	Production—1,000 bushels			
Average 1935–39	221, 769	169, 744	312, 399	758, 623
1940	299, 458	82, 233	540, 190	813, 305
1941	238, 349	166, 713	314, 825	943, 127
1942	235, 157	155, 727	556, 684	974, 176
1943	249, 855	109, 559	284, 460	841, 023
1944	150, 108	52, 069	416, 635	1, 072, 177
1945	149, 545	140, 000	305, 912	1, 123, 143
	Yield per acre—bushels			
Average 1935–39	11. 9	12. 9	12. 2	10. 4
1940	17. 1	6. 5	18. 8	13. 2
1941	13. 2	13. 9	14. 4	15. 1
1942	13. 8	16. 8	25. 8	18. 7
1943	14. 8	13. 9	16. 9	15. 3
1944	9. 7	6. 2	17. 9	16. 4
1945	10. 8	12. 6	13. 1	16. 3

[1] Planted acreage for Argentina and United States; harvested acreage for Australia and Canada. Office of Foreign Agricultural Relations.

Summed up, the wheat position was as follows: Import requirements of Europe and Asia were the largest on record and pressure for meeting them bore largely on the United States and Canada. Sup-

plying countries could have met the requirements of all regular importing countries this season; but they have had to cope also with requests from some former wheat-exporting countries, as well as from countries formerly about self-sufficient in cereals. Thus total requirements much exceeded supplies.

Rise in Fats and Oils Need

With respect to fats and oils, the situation was different. It was not primarily the result of an enormous increase in world import requirements developed within the past year, but of a tremendous reduction in the available export supplies. This situation had been apparent since 1942. International trade in fats and oils before the war amounted to 5,000,000 tons per year. Export supplies available for 1946 amounted to only 2,500,000 tons.

The great reduction resulted chiefly from Japan's occupation during the war of oilseed-exporting areas which had supplied about 35 percent of the total prewar international trade. This proportion, equal to 1½ million tons in terms of oil, came largely from Manchurian soybeans and peanuts, Chinese peanuts and tung oil, Philippine copra, and Netherlands East Indies and British Malaya copra and palm oil. Developments elsewhere intensified the shortage of fats and oils. For example, the drought in Europe seriously reduced the Mediterranean olive-oil crop and continental European oilseed production. More recently an export embargo placed on peanuts by India withheld 200,000 tons of oil from world trade. The United States and the United Kingdom in 1945 used over 500,000 tons of fats and oils from reserve stocks, and reduced their stock position to a perilously low level.

Forecasts of the Food Crisis

This Department through its Office of Foreign Agricultural Relations pointed out in 1943 that further deterioration in the food situation would occur during and after the war, and repeated the warning in 1944. "Food requirements for the liberated areas," it said in the latter year, "will tend to be considerably underestimated if these estimates are based upon levels of domestic production and standards of distribution hitherto maintained." Early in the European conflict there was danger of overestimating food difficulties in enemy-controlled territories. As the war neared its end, the opposite danger arose—that of underestimating the burden that would fall upon the supply areas of the free world. In May 1944 the Department said a large import need for continental Europe was indicated for 1945–46, with no prospect of early improvement. But the full extent of the requirement was not evident until early in 1946.

In a report in October 1945, this Department indicated that the situation had deteriorated. Continental European import needs for 1945–46, it estimated, would total as much as 18 million short tons of food, of which 15 to 16 million tons might be wheat. As regards enemy territory, the Department estimated that Germany would probably need to import as much as 4½ million tons of food in the first year following the end of hostilities. Former surplus-grain-producing regions of Germany, which had been put under Polish and Russian jurisdiction, would probably not supply significant quantities to the

deficit-producing western regions occupied by the United States, the United Kingdom, and France. As regards Japan, the Department said:

> Shortages of fertilizers and labor in Japan and Korea are believed to have reduced food production considerably in the war years: Production in Japan in 1945–46 consequently may not exceed 80 percent of the prewar average. Japanese production will fall considerably below minimum needs * * *

With respect to fats and oils, the Department of Agriculture in 1942 predicted an acute shortage as an inevitable result of the loss of supplies in the Asiatic surplus-producing areas. As a fats and oil importing country, the United States was already conscious of inadequate supplies in areas still open, such as Latin America and Africa. It was not necessary, as in the case of cereals, to follow the world situation closely in order to be aware of a possible future fats and oils shortage. Such a shortage existed from 1941 and merely became more acute as the war continued. Early in 1943 the United States chairman of the Combined Food Board Committee on Fats and Oils reported at a meeting of the committee that in the judgment of United States authorities there would be a need for at least 1,000,000 tons of fats and oils for European relief in the first year following the close of the war.

Specific Factors in the Requirements

Up to the beginning of the 1945–46 marketing year, only the United States Army relied upon the United States as a major source of export wheat. Previously, supplies from Canada, Argentina, and Australia had been the main reliance of the other takers. But the interdepartmental Requirements and Allocations Committee in June 1945 programed a total of 223 million bushels, and by September it raised this figure to 250 million bushels on the basis of new information. In January 1946 the requests against the United States for export wheat jumped to 324 million bushels; in February to 470 million bushels. Stated requirements for the second half of the marketing year, January–June, jumped from 93 million bushels, as stated in June 1945, to 358 million bushels in February 1946. These included those of United Nations Relief and Rehabilitation Administration and of paying countries.

Certain specific elements in this increase in requirements should be noted:

1. Increased requests from UNRRA. UNRRA funds, which had dropped to a low level in the closing months of 1945, were increased when Congress made additional UNRRA appropriations. Prospective requirements for United States wheat and flour on the part of UNRRA had been indicated in August 1945 at about 18 million bushels for the first half of 1946. Unforeseen developments, including drought, caused UNRRA requirements to be raised officially on December 11 to approximately 145 million bushels.

2. Requirements of the military for United States wheat for enemy-occupied territory for 1945–46. As submitted in June 1945, these totaled 63 million bushels, of which it was assumed most would be shipped during July–December. First indication of military needs for the second half of the year, January–June 1946, was 9 million bushels. Subsequent developments in occupied zones, together with

more extensive analysis of requirements, caused this figure to be raised in November to 17 million bushels, in January to 57 million bushels, and in February to 62 million bushels. Furthermore, there was no assurance until almost the end of the calendar year 1945 that funds for these military requirements would be available.

3. Paying countries, particularly France, increased their requests for United States supplies in the course of the 1945-46 marketing year. In June 1945 the indicated requirements of France and French North Africa during the 1945–46 season were 29 million bushels. By September these requirements had increased to 56 million bushels, and by March 12, 1946, to 112 million bushels, of which 92 million represented the requirements for January–June 1946.

4. The first indication that India might need extraordinary quantities of wheat in the 1945–46 marketing year came in February 1946. India's large requirements entered late into the picture because they arose out of the near failure of the winter monsoon and the resultant small grain crop and from failure to receive significant quantities of rice from Burma, French Indochina, and Siam. The large requirement of India, which is over and above the 470 million bushels mentioned and does not lie formally against United States supplies alone, totaled 75 million bushels for the period January to June 1946.

The Transition in the United States Program

Power to answer relief calls developed through our farm program; but the situation necessitated changes. Primary objective when the war began was increased production of oil-bearing materials and of meat, milk and eggs. Production of wheat and cotton was not specially encouraged; in fact, indirectly, it was discouraged, particularly as regards cotton, by the emphasis placed on oilseed and feed crops.

Lend lease, adopted in 1941, visualized a large foreign outlet for food, to which the program conformed. Geared to the needs of our military forces, of our home front, and of our allies, food in the United States increased more than one-third. No other country made anything like as great a total contribution, and only the United Kingdom made a greater contribution in proportion to its available land and human resources. But the relief need differed in composition from the wartime need.

The wartime program specially sought increased production of animal protein and of fats and oils; first, by granting subsidies on livestock products; and, second, by keeping feed prices down and giving special subsidies in respect to the use of grain for feed. For example, the Commodity Credit Corporation sold wheat for feed at reduced prices. Against this general background, we must appraise actions taken in 1945, the earliest time at which steps in anticipation of a postwar food crisis were possible. All production plans up to May 7, 1945, when the war ended in Europe, had been made and embarked upon for spring seeding and breeding operations. Formed with the end of the war not yet in sight, these plans naturally called for continued emphasis on oilseed crops and livestock products, and to that end received support from governmental policies; notably, the sale of wheat by the Commodity Credit Corporation at below cost; the maintenance of a relatively low ceiling price on corn; and subsidies on livestock products. In April 1945, however, the Commodity Credit

Corporation discontinued its "sales of wheat for feed" program in all parts of the country except the Pacific coast. Thus, 90 percent of the wheat feed subsidy program was discontinued before the war in Europe ended. In September the wheat sales program applicable to the Pacific coast was discontinued. Thus an important change of emphasis had been started.

Timing of the Transition

Encouraged during the war through payments to livestock producers and through the maintenance of a relatively low ceiling price on corn, livestock expansion left us with a larger livestock population than could be adequately fed with available feed supplies simultaneously with the export shipment of enormous quantities of food grain. But the policy of specially encouraging the production of livestock products and vegetable oils could not have been reversed while the war was still going on. Change in it was necessarily a postwar operation. Our civilian supply of meat was low when the war ended and dissatisfaction had spread throughout the country. Sharply curtailed meat production in 1945 might have aroused strong opposition. In any event, it could not have yielded significant results in terms of additional grain for export in 1945, since livestock production cannot be curtailed abruptly. It is doubtful, in view of this fact and also of the uncertain early basis of the relief requisitions, if relief supplies of grain could have been made available much earlier than they actually were.

In the wisdom of hindsight, the fall of 1944 was the best time for drastic action to conserve grain for the present emergency. But the war had not then ended; droughts had not yet curtailed world production below the low level caused by the war itself; and meanwhile meat shortages were developing in the United States. In August 1945, lend-lease was ended, and substitute arrangements to finance the movement of grain and other food products overseas did not immediately follow. Moreover, transportation facilities were still heavily taxed largely by returning soldiers and other military movements. As mentioned, nevertheless, the Department in the marketing year 1945–46 made strenuous efforts to secure wheat for export and put it in position for export, with the results already described.

Action taken by the Department in reference to fats and oils began early in 1942; it was timely, extensive, and effective. The only course then open was to increase our domestic production and to conserve supplies. Production goals were increased; price supports and incentive payments were offered. Premiums for heavy hogs increased lard supplies. Lard production broke all records. Production of peanuts nearly doubled; that of soybeans more than trebled. Flaxseed production averaged nearly 38,500,000 bushels, as compared with an average of 19,500,000 in the five prewar years. From a net annual importer of 1,000,000 tons of fats and oils, the United States in 1946 became a net exporter of approximately 80,000 tons.

The Food Record as a Whole

In retrospect, when we view the whole matter in the light of the facts and controlling circumstances encountered each step of the way since the war began, we can say that the record of our food front is good.

This is especially true of the performance of the farmers; but it is also true of official agricultural agencies, both Federal and State, which had the responsibility of indicating requirements and providing aid to agriculture in fulfilling them. The record shows that these agencies appraised developments accurately and opportunely particularly those connected with the droughts and with the needs of importing countries. In judging the response, from the standpoint of its promptness, it should be borne in mind that a firm basis for extraordinary efforts to secure additional supplies of food grain for export did not exist until the first of the calendar year 1946.

THE WORLD FOOD SITUATION

The world's food production for 1946–47 will be about 7% larger than in the previous year, and may be above the prewar average. But the increase will be largely offset by a sharp reduction in carry-overs, particularly of bread grains. Hence the world's total supply of food will still be uncomfortably low.

World food supplies generally for the 1946–47 consumption year (August–July) will be slightly larger than those for 1945–46 though considerably below average. Continued favorable weather for the growing and harvesting of food crops is apparently more than offsetting reductions in food stocks.

Food-deficit regions account for a major part of the expected increase in output. Hence, smaller international shipments will be required in 1946–47 to maintain emergency levels of consumption than were required in 1945–46. Nevertheless, if the food situation is to improve as a whole, large imports will be necessary even if food-shortage countries still practice wartime economies in the utilization of crops.

Midsummer crop conditions were better than a year earlier in North America and central Europe, and weather for harvest was somewhat better than last year in Russia. This improvement was partially offset by poor crop prospects in south China. New crops had already eased the food situation somewhat in North Africa and southern Europe, but food supplies remained unusually short in parts of China and India because of sharp reductions in the summer rice crop. Limited relief supplies moved into famine areas, against difficulties caused by lack of transportation facilities.

The world's 1946–47 wheat crop will be considerably larger than that of 1945–46.

Conditions for growing and harvesting the 1946–47 wheat crop have been satisfactory in the principal producing countries of the Northern Hemisphere. Except in droughty parts of Australia, an expanded acreage has been planted under generally favorable conditions in the Southern Hemisphere. Should favorable growing conditions continue in the latter area, the world output of wheat may nearly equal the prewar average of 5.9 billion bushels. This would be about 700 million bushels, or 13 percent above the 1945–46 crop.

But stocks of wheat in the surplus-producing countries on July 1 were about 450 million bushels below a year earlier. Stocks had undoubtedly been reduced to unusually low levels in many of the importing countries. Hence total wheat supplies for 1946–47 will be little, if any, larger than those for 1945–46.

Indications were that the world's rye crop would be above the previous short crop, though substantially below the prewar level. Likewise the world's rice crop promised to exceed last year's short crop and yet not to equal the prewar average; in the surplus-producing areas of southeastern Asia it was expected to be considerably below prewar. It was consequently evident that wheat would continue to be the main world-relief food.

It was likely the world would produce a somewhat larger sugar crop than that produced in 1945–46. The beet and cane crop forecasts for the United States indicated approximately 2.2 million tons (raw value equivalent) of sugar, or about one-fourth more than in 1945. Beet acreage in Europe was larger than in the previous year, though the production forecast was below the earlier expectation. How much of Europe's sugar-beet crop could be turned into sugar depended on various uncertain factors, such as the livestock feed supply, transportation facilities, and fuel for sugar processing. In Cuba the 1947 crop is expected to be about 10 percent above the 1946 crop of 4.5 million tons. Prospects for obtaining sugar in the Far East were still very uncertain, though production in the Philippines was expected to be larger than in 1945.

Supplies of edible fats and oils continued to be far below requirements. In a few countries the prices of such commodities advanced sharply and added to the difficulty of getting supplies for relief purposes. Progress in expanding copra production in the Philippines and in the Netherlands East Indies was a partial offset. It was certain, however, that world supplies would continue to be inadequate during 1946–47.

As in previous recent years the United States was a mainstay in the difficult world food situation. The record United States feed-grain crop reported in July promised livestock feed supplies above expectations and indicated that exports both of feed grain and of livestock products might be continued.

In other parts of the world supplies of feed were extremely low, and marked advances in prices of feeds were sharply curtailing the feeding of livestock, particularly hogs and poultry.

Hence total world supplies of meats, dairy products, and eggs are likely to be smaller during 1946–47 than they were during 1945–46.

Problems Following War's End

The world's food production in 1945, which largely influenced the food consumption of 1946, was probably 12 percent per capita below prewar level and lower by twice or thrice that percentage in parts of Europe and the Far East. Acreage in crops in various parts of the world was still below prewar and yields were reduced by lack of fertilizer and proper equipment to cultivate crops intensively, and also by droughts in Europe, North Africa, and Southern Hemisphere countries.

Only in the United States and Canada, in the British Isles, and in the Middle East was food production in 1945 relatively favorable. In the United States the 1945 production was still at a record level—about one-third above that of prewar years. Production in continental Europe was 25 percent below prewar levels; it suffered from the

damage from the war and from extensive drought, which extended into North Africa.

Drought in 1945 curtailed production also in several countries of the Southern Hemisphere. Production in Australia, South Africa, and the southern half of South America was low because of drought and for other causes. Growing conditions were unfavorable in Japan. Food production was below prewar levels in India and China; in fact local crop failures resulted in famine in parts of both China and India during the early months of 1946.

Western European Countries

Food consumption in France and the Low Countries during the war dropped to around 75 percent of prewar. France, previously about five-sixths self-sufficient, could not maintain food output; supplies were further reduced by a drastic cut in imports and by German requisitions. Conditions improved as German requisitions ceased and imports were resumed. In 1945–46, despite an unusually poor harvest in 1945, France's food consumption rose to over 80 percent of prewar. Considerable recovery in crop output occurred in 1946, though prewar levels were not reached.

The Low Countries increased their food production during the war. But the increase only partially compensated for lost imports of food and feed, which in prewar times had contributed about two-fifths of the Dutch and about half of the Belgian food supplies. Conditions improved when the Germans were driven out and imports began to arrive. The 1945 harvest in both Belgium and the Netherlands was far below wartime levels, yet their food consumption in 1945–46 recovered to around 85 percent of prewar. Food output improved in both countries in 1946, but need for heavy imports continued.

Norway and Finland suffered a cut in food supplies as drastic during the war as did the western European countries. Both countries received some food on balance from Germany. Norway was less than 50 percent self-sufficient before the war, and Finnish food production declined sharply. After the war Norway's imports recovered strongly, and the domestic food output was well maintained. Consumption in 1945–46 in Norway rose to around 85 percent of prewar. Finland, whose 1945 harvest was poor and whose imports could be less easily obtained, achieved only a slight improvement in consumption levels in 1945–46.

In Sweden and Denmark the wartime decline in consumption was held within narrow limits. Both countries increased their food production. Neutral Sweden, about 90 percent self-sufficient in prewar times, continued to receive some food from overseas. Denmark, a net exporter before the war, continued to export considerable quantities of food and at the same time to maintain consumption at satisfactory levels. In both countries the food situation was favorable in 1945–46. Denmark had a substantial exportable surplus.

Central Europe

Central Europe was relatively well off during most of the war period. Germany, almost 85 percent self-sufficient in the last prewar years, increased food production somewhat and obtained large amounts of

food and feed from occupied Europe. But it exported some food to certain countries (Austria, Finland, Norway, Belgium), the requirements of the German army were heavy, and the population increased from the importation of foreign labor. Nevertheless, the 1943–44 average per capita consumption of German civilians was over 85 percent of prewar.

Thereafter, Germany's food situation deteriorated rapidly. The allied advance cut off German takings, disrupted distribution, and interfered with farming. After the surrender, Germany lost the surplus-food region east of the Oder-Neisse. The remainder of the country had been about 70 percent self-sufficient before the war, when the population was considerably smaller. Germany's postwar population had been swelled by the immigration of Germans from the east and from Czechoslovakia. Despite substantial imports of wheat into western Germany, consumption levels in all four occupation zones in 1945–46 were less than 75 percent of prewar. The outlook for 1946–47 promised little improvement in output.

Wartime developments in Austria were similar. Food production held up well. Austria, dependent previously on imports for about one-fourth of its food, received enough food from Germany to keep consumption levels near the relatively good German standard. As the war drew to a close, however, the food situation in Austria, as in Germany, deteriorated. Food production in the first postwar season fell heavily and 1946 harvest prospects indicated need for continued heavy imports in 1946–47 merely to maintain the low 1945–46 consumption level.

While German wartime requisitions from Czechoslovakia, which was previously 95 percent self-sufficient, reduced consumption there, food supplies remained at comparatively high levels during the war. In Czechoslovakia the 1945–46 food situation was also relatively favorable, and food production was expected to increase in 1946–47. A decrease in population, caused mainly by expulsion of Germans and Hungarians, may bring per capita output close to prewar levels.

Switzerland managed fairly well throughout the war. Imports entered though in smaller volume than before the war, when they accounted for around half the Swiss food supplies. Meantime production increased and partly offset the decline in imports. Production in 1946–47 was expected to remain at the high wartime levels.

Poland and Danube Basin

Poland suffered severely both during the war and in 1945–46. Swept more than once by invading armies, it had to make heavy contributions to the occupying powers. Prewar Poland exported surpluses of grain, sugar, potatoes, and meat. Today the territory and the population are smaller. The per capita land supply has increased and its quality is better; but production has suffered from reduction in livestock, land reforms, settlement policies, continued disruption of transport, and disturbed economic conditions. However, food output in 1946–47 was expected to exceed the low level reached in 1945–46.

Hungary, Rumania, Bulgaria, and Yugoslavia were surplus-food-producing countries before the war. Agriculture in the Danube Basin suffered little during the first 5 war years. Exports to Germany were

not large enough to cut consumption very much, except that of some urban consumers. In 1945–46, however, food supplies decreased sharply. Production was reduced to low levels as a result of drought, battle damage in some areas, generally disrupted transport, and unstable political and economic conditions. Reparations payments and the requirements of occupying forces accentuated the food shortage in urban and deficit rural areas in Hungary, Rumania, and Bulgaria. In Yugoslavia the situation in such areas was partly relieved by imports from overseas. All four countries expected to have a better harvest in 1946 than in 1945; but appreciable export of food from the Danube Basin to the west was unlikely.

Other European Countries

In Greece, only 75 percent self-sufficient before the war, food supplies fell to very low levels after the German invasion. Production declined, imports were cut off, and exports had to be made to Axis nations. Great distress resulted in many parts of Greece. Arrangements were made as early as the summer of 1942 to ship in some Allied food through the International Swedish-Swiss Relief Commission. Following the liberation, imports into Greece increased in volume. In 1945–46, despite a drought-reduced domestic output, average per capita consumption exceeded 85 percent of the prewar level. Harvest prospects for 1946 were considerably more favorable than a year earlier, but Greece continued to need large imports.

In Italy supplies were well maintained during the first part of the war and then declined. The domestic agriculture, which had furnished over 90 percent of the food consumed in the last prewar years, showed some deterioration prior to the Allied landing. Thereafter it suffered further from the direct and indirect effects of military campaigns fought over the length of the country. In 1945 it was struck by drought. Large imports entered from overseas; yet food supplies in 1945–46 sank to around 75 percent of the average for the last prewar years. Food production for 1946–47 will be substantially larger than the production for 1945–46, though short of the prewar level.

Spain's food difficulties originated mainly during its civil war of 1936–39, up to which time the country had been generally self-sufficient in food. Production declined during the civil war period, and showed little recovery afterward. Food supplies remained small in the early war years; rose as imports increased; fell heavily again in 1945–46, when drought cut production. Weather conditions were more favorable this year, and the harvest was fairly good.

Portugal suffered no battle damage and was able to import food enough to largely offset fluctuations in the domestic output. Up to 1945–46 the decline in per capita supplies was relatively small. Production then fell heavily from drought and imports could not be readily increased. Output in 1946–47 showed a marked recovery.

Deterioration in Quality and Distribution

Continental Europe is suffering also from a decline in the quality of the food supplies. Livestock products of all kinds, reflecting the

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loss of imported feeds and the diversion of crops from feed to food uses, became extremely short during the war, and many animals were destroyed or removed in the campaigns of 1944–45. Though considerable quantities of animal protein foods were imported in 1945–46, continental European supplies of animal protein foods showed little, if any, improvement.

Moreover, inequitable distribution prevails widely. Producers of food can seldom be compelled to restrict their own consumption; hence the brunt of food shortages falls upon the nonfarm population. Average per capita nonfarm supplies in 1945–46, in terms of energy value ranged below 1,800 daily in Germany, Austria, Italy, Poland, Spain, and parts of Hungary; between 1,800 and 2,100 calories daily in Greece, Portugal, Finland, and parts of Yugoslavia and Rumania; between 2,100 and 2,500 calories daily in France, Czechoslovakia, Belgium, the Netherlands, Norway, and Switzerland; and above 2,500 calories in Sweden and Denmark.

Supplies were also unevenly distributed between different consumer groups, especially where administrative control over distribution was weak. This was the case in large parts of Europe. Rarely were supplies distributed evenly throughout 1945–46. Most countries consumed food at a higher rate during the first part of the season than could be maintained during the latter part. Widespread reduction in rations became necessary in the spring and early summer of 1946.

Supplies from domestic resources in continental Europe will be larger in 1946–47 than in 1945–46. Yet production will still be considerably short of the average in prewar times. Even then, continental Europe imported some 10 percent of its food supplies (including feed in terms of food). Large amounts of food must be imported even to maintain the low 1945–46 consumption levels.

Middle East in Good Shape

Predominantly agricultural and pastoral, and not a major battleground in World War II, the Middle East began the 1945–46 crop season with prospects of ample food supplies. Formerly, the region as a whole, with the exception of Palestine, was practically self-sufficient in its major food requirements and exported considerable quantities of citrus, dried fruits, cereals, nuts, and vegetable oil. It has not declined in productivity, but populations have increased and transport difficulties have developed.

Growing conditions were generally favorable in 1945, and 1946 began with good prospects for the harvests, and without shortages of draft power or labor. Egypt particularly looked ahead with confidence, while Turkey, Palestine, Iraq, and Iran had generally good agricultural and food conditions. Crops in Turkey suffered to some extent from drought in 1945, but carry-over stocks were sufficient to make imports unnecessary.

In Palestine, though farm production has increased greatly, population growth prevents self-sufficienty. The country depends heavily on food and feed imports, sometimes difficult to get. Palestine will require increased imports during 1946, but supplies are available in the neghboring countries.

Food-crop production increased in Iraq during the war and was well maintained in 1945; sugar was the only major deficit item. Produc-

tion in Iran normally comes close to requirements, but the war caused shortages, and necessitated imports. By 1944, however, crops had been restored to the prewar level in some cases and raised above it in other cases. Livestock conditions promised ample supplies of meat and dairy products. Syria and Lebanon were in a position this year to dispense with major imports.

Conditions Bad in Far East

Different conditions prevailed in the Far East. In Japan farm food production in 1945 was barely three-fourths of prewar; the fish supply had declined sharply; imports from the formerly dominated areas had been lost. These conditions involved a tremendous drop in the per capita food-consumption. In prewar years Japan proper had to import nearly one-fifth of its food supply. Its production during the war declined from lack of manpower, tools, and fertilizer, and in 1945 from poor growing conditions also.

With the population increased by births and repatriation, food supplies per capita have dropped to a mere subsistence level, and acorns, silkworms, locusts, vegetable leaves, and industrial refuse were used as food substitutes. As in other hungry countries, the farmers suffered less than the city dwellers. Nonfarmers, down to less than half their prewar diet, had to struggle with disrupted transportation, lack of goods to offer in exchange for food, black marketing, and inflation.

Big Deficit in the Philippines

The Philippines had a big food deficit and were dependent much more than in prewar years on imports. Rice, the staple food, was 40 percent below prewar production in 1945; in addition, the Islands faced acute shortages of wheat, corn, dairy products, meat, and fish. They had no sugar for export, though in prewar years the Philippines exported annually as much as 888,000 short tons. Essential food imports, which must come largely from the United States, include rice, wheat flour, fish, and dairy products. Estimated rice import requirements for 1946 run above 385,000 short tons, but a part of this will necessarily be replaced by wheat flour.

The outlook in the Philippines for domestic supplies of sugar, fish, and animal products is even less favorable than for rice. An added difficulty is the disruption of interisland shipping. With shipments from surplus areas to deficit areas difficult, food crops must be expanded in local areas, at the expense of long-established export crops, such as sugar, coconut products, and fiber. Food shortages due primarily to transportation breakdowns may develop similarly in large parts of Java. Large cities, notably Batavia, Semarang, and Surabaya, have already suffered.

Food Problems in China and India

The rice crop in China provides nearly one-half the food supply of that country; in 1945 China's rice production was 12 percent below prewar production. Output of other cereals, however, was slightly above prewar. Sweetpotato production increased during the war years. Because of the importance of rice, however, total food output

was still somewhat below prewar, while the population was larger. As the 1945–46 consumption year progressed, shortages became critical. In the interior Provinces of Honan, Hunan, Hupeh, and Kwangsi, where war devastation was greatest, serious famine conditions developed.

Similar conditions existed in the Kwangtung Province, partly from reduced production and partly because imported supplies were down. Fortunately, the 1946 wheat crop will be above last year's. Weather conditions have been favorable in north and central China and the wheat acreage has increased slightly. This crop should ease the food situation in north China.

Serious food shortages have occurred in India, perpetually an undernourished country. Normally India imports 1.5 to 2 million tons of rice; it exports cotton, jute, linseed, tea, and peanuts. During the war India could not reach its normal sources of rice imports and crop acreage was shifted from cotton and jute to millets and rice. The expanded acreage and better-than-average yields averted serious famine conditions in 1944 and 1945. Failure of the fall monsoon in 1945, however, reduced the 1945–46 rice and millet crops; and drought during the spring of 1946 in the Central Provinces and in the Punjab reduced the yield of wheat. This loss, added to the food shortage caused by the reduced rice and millet crop, indicated large imports would be necessary to avoid actual famine in some places.

FARM REHABILITATION IN WAR-TORN LANDS

As it came to a head the world food shortage revealed a degree of agricultural prostration in many countries that forebade hopes of quick recovery. Fighting had pockmarked the land with shell holes, sowed it with mines, and turned large areas into untillable wastes. Fighting had also destroyed roads, bridges, drainage works, and irrigation systems, with consequent heavy damage to farm productivity. Machinery and other farm equipment, supplies of fertilizer, and even seed supplies had been destroyed or removed from farming areas, and replacement facilities had suffered. Added handicaps to farming resulted from the disruption of trade facilities, of transportation systems, and sometimes of political and social institutions. It was evident, from reports received by this Department and UNRRA, that after the relief job the next priority would be extensive agricultural rehabilitation, with special emphasis on machinery, draft power, fertilizers, and seeds.

Ultimately, the remedy for shortages of this kind must be developed within the hungry countries. The UNRRA program, even supplemented by commercial shipments of agricultural supplies, can meet only a fraction of the need. Devastated countries must again, for the most part, have domestic or nearby sources of tractors, seed drills, plows, combines, and so forth. Alternatively, they must have products capable of being exchanged for imported agricultural tools, implements, and supplies. Meantime, they can get a start in reequipping their farms through UNRRA programs and through shipments arranged and financed in other ways. Along with shipments of food,

UNRRA has already furnished quantities of farm-production facilities to hungry countries and as the food crisis wanes the rehabilitation phase will continue.

Draft Power and Tillage Implements

Farm draft power of the UNRRA countries in Europe is only half what it was before the war. In the spring of 1946, out of the prewar 9,981,000 draft-power units, only 5,198,000, or 52 percent, remained. Moreover, the remaining units consisted mostly of worn-out tractors, and of lame, blind, diseased, or over-age animals. In Italy about two-thirds of the tractors were obsolete. In Oriental countries the draft-power shortage was less extreme; the estimated loss in China, for example, was 20 percent. Nevertheless, the Orient's shortage of draft animals and of machine power was critical because the traditional reliance there on human muscle was strained already to the breaking point. Moreover, men, women, and children when harnessed to implements often use up more food energy than their work can produce, so that farming by this method may ultimately increase the food shortage.

In most countries, both in Europe and in the Orient, tillage implements also are scarce. The destruction of farm tools and machines has about equalled the losses sustained in draft power. Thus even if human muscle could be substituted effectively for animal and engine power, it could not be fully put to work. Observers report the use of it, nevertheless, even in once highly mechanized farm areas. In machinery shortage, Yugoslavia is typical. Yugoslavia lost 15,000 harvesting machines, and has only 10,000 left, most of them in bad condition. In China, where the Japanese stripped every scrap of metal from the occupied areas, one-horse cultivators and walking plows are chiefly in demand.

All the war-torn countries desperately need repair shops and repair materials. Lack of pumps and of piping prevented the use this year of many irrigation wells; lack of rubber hose for sprayers hampered the protection of crops from insects; lack of threshers threatened losses in harvesting. Lack of dairy processing equipment worsened the shortage of milk and milk products. Farm recovery in many countries awaited the provision of farm facilities, with hunger or dependence on relief-food imports the only alternative.

U. S. Power to Help

What the United States may be able to contribute in draft power and farm machinery to the war-torn countries depends partly, of course, on the domestic call for these facilities. This continues to run above the supply; if the disparity remains, United States crops will ultimately suffer and consequently this country's food-export power. Production of tractors, combines, corn pickers, and other farm machines lagged in the 1945–46 season, partly from shortages of components and materials and partly from labor difficulties. In the second half of 1945 the output was only about the same as in the second half of 1944, though a 30-percent increase had been expected. In the early

months of 1946 the output declined as compared with that of a year earlier. Eventually, it will increase. As the output grows, our own farmers and many farmers in other countries will be able to draw more freely on it. Much American farm machinery has gone abroad this year. Exports of farm machinery in the 9 months ended April 1, 1946, through UNRRA and lend-lease, amounted to about 110 million dollars. About 10 million dollars represented purchases by UNRRA. Total exports of farm machinery in the calendar year 1945 amounted to more than 160 million dollars.

In August UNRRA announced that the total number of animals shipped or scheduled for shipment against its programs are as follows: Horses and mules, 254,000; cattle, 26,000; donkeys, 6,000; water buffaloes, 3,000; hogs, 3,180; sheep, 2,266; goats, 1,700.

By August 1, shipments amounted to 127,300 animals, of which 101,300 were work animals and 26,000 dairy cattle. These animals went chiefly to Yugoslavia, Greece, Poland, Czechoslovakia, and China (792 mules). It was expected that by December the total shipment would be around 300,000 head, including some 150,000 mares.

UNRRA's livestock program will replace an estimated 2 to 3 percent of all the wartime losses of animal draft power in the countries concerned.

Fertilizer Requirements

In fertilizers the United States has answered foreign requirements more liberally in recent years than anyone would have thought possible. But its own fertilizer requirements are increasing. On a world basis, the production of every major fertilizer (nitrogen, phosphate, and potash) is far short of the demand. Some figures of United States consumption suggest what foreign countries may expect from the United States. So far it has not been able to meet requests from liberated and other countries.

In countries that suffered heavy war damage, fertilizer production is either wholly lacking or running at a very low rate. Fertilizer requirements in these countries are usually higher than in prewar years because of inroads made during the war years on soil fertility. The United States during the war supplied fertilizer to many countries in the Western Hemisphere and also to some of its allies overseas. Since the war, other supplies have become available to foreign countries; yet calls from liberated countries continue to be made upon United States production. Shipments include both nitrogenous and phosphatic fertilizers.

The largest producer of nitrogen in prewar years was Germany, with Chile in the second place, Japan in the third, and the United States in fourth place. Other important producing countries were the United Kingdom, Norway, the Netherlands, Belgium, France, and Italy. Among these countries the only ones with export capacity now are the United States, Canada, Chile, Norway and the United Kingdom; the others can meet only a small part of their own requirements.

In prewar years Germany was the heaviest producer of potash; it refined up to 70 percent of the world's supply outside of the USSR. Thus, the duration of the potash shortage will depend materially on the rate of increase in Germany's production. Potash production in the United States and in other producing countries, such as France,

Spain, and Palestine, is far below world requirements. It is doubtful if and when potash production will be resumed in the Galicia mines, formerly in Poland. These mines are now flooded.

In phosphate rock, the main source of supply for Europe has continued to be North Africa, where supplies generally have kept abreast of shipping facilities. United States rock has nearly all been used to meet the requirements of countries in the Western Hemisphere. The processing of rock into soluble phosphates is affected by problems which vary in individual countries, with transportation and supplies of pyrites the principal limiting factors.

Fertilizer Use in the United States

Fertilizer consumption in the United States has increased steadily since the early 1920's, except for a dip in the depression years. At the outbreak of the war it was a record level. During the war years it rose to new high levels, with nitrogen up 50 percent over prewar consumption, and phosphate and potash up around 60 percent. Even so the domestic demand could not be met in full. Fertilizer exports were much below the requests. Needless to say, our increased use of fertilizer, along with other improved farm practices, was important in the Nation's wartime food production.

The United States draws on nitrogen produced domestically and imported from Canada and Chile; on phosphate rock mined from supplies in Florida, Tennessee, and Western deposits; and on potash from recently developed supplies in New Mexico, Utah, and California. Besides nitrogen from plants owned by private industry, substantial tonnage is now being obtained from plants established by the Government for the production of munitions. However, only a small part of the Government-owned capacity for synthetic ammonia production has been converted to the manufacture of fertilizer. Phosphate-rock and potash mines in the United States are operating as fully as the available labor, transportation, and equipment allow. Also some additions to the phosphate-rock mining facilities in Florida are being installed.

Key to the export possibilities is the fact that the present use of fertilizer in the United States, high though it is, would be much higher under prevailing conditions if larger supplies were available. Our minimum nitrogen requirement for the 1945–46 fertilizer year was estimated at 800,000 short tons. Domestic production and imports together will provide less than 700,000 tons. This quantity may be compared with 384,000 tons used in 1938. Our estimated requirements of soluble phosphates for 1945–46 were 1,850,000 tons P_2O_5. The consumption was about 1,420,000 tons, as compared with 744,000 tons in 1938. Potash requirements were estimated at 800,000 tons K_2O. The expected production of potash for agriculture is not quite 700,000 tons K_2O but this compares with only 394,000 tons for 1938. Responding to requirements for domestic consumption and simultaneously providing minimum supplies for export puts heavy pressure on our fertilizer industry.

Shortages of Seed

Shortage of seed is the most basic farm shortage. As long as it continues, recovery from food-shortage conditions is impossible. This

country and Canada sent important quantities of agricultural seeds abroad in the war years. With Europe overrun by Germany and with the oceans infested with submarines, North America was the most accessible source. Our shipments of field seeds, seed grains, and vegetable seeds made an important wartime contribution to the food resources of the United Kingdom, Russia, and other countries associated with us in the war.

When the war ended, our seed supplies began moving to an expanded list of countries, ex-enemy as well as liberated and friendly. This year the demand may be as great or greater than it was last year. It is at an all-time high and may continue about on that level for at least another year. Some idea of Europe's run-down condition can be gained from the fact that in 1945–46 we shipped more of some kinds of vegetable seeds to Europe than we used ourselves.

Principally, the seeds we are exporting to UNRRA and other needy countries are the grass seeds, legume seeds, small grains, seed corn, and the important vegetable seeds. Most countries of Western Europe and also the United Kingdom and Russia are getting some seeds from the United States. Scanty in the early war years, the supplies of vegetable seeds and some other seeds are now generally adequate. In the last year or so, we have not had to refuse any request for vegetable seed from foreign countries because of any shortage here. Some of our field seeds, however, are still comparatively scarce; this country has been able to meet only a few requests for alfalfa, red clover, and alsike clover. Broadly, except for these few kinds of seeds, meeting the foreign demand is a shipping and distribution problem rather than a production problem. In most lines, seed production can be increased to the extent desired.

Typical of our capacity in this respect is the fact that in 1944 and 1945 the United States was producing enough vegetable seed to supply practically the whole world. Output of the large-seeded vegetables such as peas, beans, and sweet corn was threefold that of prewar years; production of small vegetable seeds was almost fourfold. Production of biennial seed crops like beet, cabbage, carrot, and onion was nearly 4½ times the prewar average. Principally, the increase was for export. Seed purchases for export from this country in the years 1943 through 1945, mainly through lend-lease, amounted to about 75 million dollars.

New High in Seed Exports

It was supposed 1945 would see the peak of this seed-export movement; yet 1946 is setting a new high record. Tapering off will be a problem eventually. Shipments to foreign countries in 1946 may run as high as 200 million pounds of seeds as compared with prewar annual totals of 10 to 20 million pounds. Before the war Europe used to send vegetable seeds to the United States—annually about 6 million pounds of some 15 kinds. It has been on the receiving end the past 2 years to the extent of perhaps four times that quantity.

Our exports of field seeds, vegetable seeds and seed grains are now mostly through UNRRA and to the Army occupying ex-enemy countries, with some shipments to paying countries. In 1944 and 1945, the Army handled considerable quantities in connection with its wake-of-battle operations; those operations have lessened. Such

shipments tell the food-shortage story as eloquently as do the relief-food shipments, because only the worst adversity cuts into seed supplies. Our shipments of field seeds between July 1, 1945, and June 30, 1946, totaled 186,000,000 pounds; in the same period our export shipments of vegetable seeds totaled 34,000,000 pounds.

Besides bulk seeds, this country is exporting garden-seed collections both to Europe and to the Orient. These help to establish or to restore small gardens, the natural recourse of hungry people wherever seed and land can be obtained.

TRANSITION TO COMMERCIAL FOREIGN TRADE

The defeat of Germany and then of Japan, and the subsequent termination of lend-lease, led to a brief period of contraction in our exports (with the important exception of wheat). This affected both agricultural and nonagricultural commodities. Expansion occurred toward the end of 1945, followed by further expansion during 1946. Most of the increases were in food products. The increased shipments were made possible by this Nation's large contribution to UNRRA and by large United States loans to foreign governments.

In contrast to wartime trends, agricultural exports after the end of the war and of lend-lease dropped proportionately less than the nonagricultural exports. Conversely, the subsequent expansion of the agricultural exports was proportionately much greater. In the first quarter of 1946 the value of our agricultural exports (846 million dollars) was 69 percent higher than in the corresponding period of 1945, while the value of nonagricultural exports was about 40 percent lower.

The agricultural exports consisted of shipments in liquidation of the lend-lease program, of relief shipments, and of commercial shipments. Wartime lend-lease accounted for about four-fifths of our agricultural exports in 1943 and 1944 and for about two-thirds in the first half of 1945. After the termination, special intergovernmental payment and credit arrangements permitted the exportation of goods originally placed at the disposal of foreign countries under the lend-lease program. These arrangements during the first quarter of 1946, however, accounted for only 16 percent of our total agricultural exports. They will come to an end soon.

Emergency assistance given to foreign countries, for the feeding of civilians in occupied countries by the United States Armed Forces and for UNRRA relief work, accounted for a substantial part of our overseas shipments in 1945 and 1946. Shipments to the armed forces are not included in the regular export statistics. Shipments by UNRRA, to which the United States by the end of 1945 had authorized contributions of 2.75 billion dollars, totaled 355 million dollars for 1945 and 326 million for the first quarter of 1946. Largely, they consisted of agricultural products: (e. g. 77 percent for the first quarter of 1946).

Exports Through Nongovernmental Channels

Much reexpansion of exports handled through nongovernmental channels took place. More than half our agricultural exports belonged to this category in the first 3 months of 1946, as compared with only one-fifth to one-third in the later war years.

Naturally, the transition from war to peace has affected exports of principal agricultural products differently. Following the Japanese surrender in August 1945, emergency needs in Europe and in the Far East exerted increasing influence. Wheat exports (including flour) began to increase soon after the liberation of enemy-held areas. They nearly trebled in value during the first 7 months of 1945. After the Japanese surrender the wheat export soared. They totaled 99 million bushels worth 180 million dollars, in the first 3 months of 1946, several times above the prewar rate in volume and even more in value.

Various Crops in Export Trade

During the first 7 months of 1945, cotton exports increased substantially from their low wartime level, but declined temporarily after the Japanese surrender and the termination of lend-lease. Credit arrangements facilitated their subsequent reexpansion, with the result that in the first quarter of 1946 cotton exports reached a value of 102 million dollars (twice as much as in the first quarter of 1945). The volume, however, still was only slightly more than half of that of the first quarter of 1938.

Tobacco exports expanded in the first quarter of 1946 to a value of more than one-fourth above that of the first quarter of 1945, or twice that of the first quarter of 1938. The volume also was above the prewar level.

After fluctuating at high levels up to September 1945, exports of meats and dairy products declined sharply in October in consequence of the termination of lend-lease, but soon increased again. In 1946 they were considerably above the level maintained during the first part of 1945, and were many times larger than before the war.

Lard exports declined from a 16 million dollar peak in March 1945 to less than 1.7 million in October and then reexpanded to a level above that of prewar years but below the first quarter of 1945.

Exports of eggs and egg products declined from the average of more than 20 million dollars of the first 8 months of 1945 to less than 1 million in October and November. New arrangements for dried-egg purchases by the United Kingdom brought a gradual recovery to 8.5 million in March 1946. But this was still only one-half of the value of exported eggs and egg products during the same month of 1945.

Fruit and vegetable exports, after a decline associated with the termination of lend-lease, reexpanded and in 1946 were above 1945 levels. Some fruits and vegetables continued to suffer from import restrictions. Apple exports during the first quarter of 1946 were only 16 percent of those during the corresponding period of 1938. In other instances, foreign import restrictions had partial offsets. For example, the Canadian market for United States citrus fruit expanded.

Our Agricultural Imports

Our agricultural imports declined in value slightly during 1945, but increased during the first 3 months of 1946, to a point at which they exceeded those of the corresponding period of 1945 by more than one-tenth. Our imports of complementary as distinguished from competitive or supplementary products increased. Import developments were an increase in the imports of natural rubber, and the resumption

of silk imports. These imports had shown some upward trend during 1945. On the other hand, imports of supplementary products, required to help out insufficient domestic production, decreased slightly, after a decrease by nearly one-fifth from 1944 to 1945. Further decline took place in our grain imports.

Abnormal Character of Farm Export Trade

Currently, our foreign trade in agricultural products is highly abnormal, as appears particularly from a look at the distribution by countries. For example, more than a third of our wheat exports (including flour) in the first quarter of 1946 went to Italy and France; these countries bought very little United States wheat before this war. Other wheat exports went to North Africa and Eastern Europe, areas that normally export wheat. France ranked second in our lard exports; on the other hand the share of the United Kingdom and Cuba, the two largest prewar buyers of United States lard declined greatly. In meat exports the share of the United Kingdom the largest buyer before the war, dropped sharply; meantime large quantities went to the Soviet Union, Yugoslavia, France, and other countries which had no importance in our prewar meat trade. Nearly all our dairy exports went to countries that imported little dairy produce from us before the war.

Further changes are to be expected in our agricultural trade with other countries. In some instances, as in meat for example, the domestic market may absorb a large proportion of the output. In tobacco, fruits, and vegetables, we may hold or increase our export trade, provided that trade values are reduced and dollar exchange remains adequately available to the foreign buyer. In the long run, foreign demand for our agricultural products will depend largely on economic activity here and abroad. This applies also to our agricultural imports. Much depends, in other words, on the outcome of current efforts to foster world-wide economic development.

TECHNICAL INTERNATIONAL COLLABORATION IN AGRICULTURE

The Department of Agriculture is taking part in a long-term, international program of agricultural science and research. This program was initiated early in 1942 by the technical collaboration branch of the Department's Office of Foreign Agricultural Relations. It involves cooperation with the Department of State through an Interdepartmental Committee on Cultural and Scientific Cooperation.

Broad in scope, the program involves three major objectives:

1. Cooperative establishment and operation of agricultural stations in other American Republics, primarily to stimulate the production of crops such as rubber and quinine of which there is a hemispheric deficiency.

2. Training in the United States of a limited number of foreign technicians, so that they may operate the cooperative stations; also, training in this country of some foreign farm specialists, who may be expected after their return home to initiate and manage programs for

extension training, soil conservation, rural electrification, storage, irrigation, and drainage, and collection of crop and livestock statistics.

3. Sponsoring, jointly with the Department of State, of agricultural missions, which visit other countries when invited and collaborate with foreign officials in agricultural studies and program planning.

Cooperative agricultural stations are now operating in Ecuador, El Salvador, Guatemala, Nicaragua, and Peru. Cooperative projects are under way in Brazil and Cuba; agricultural experimental operations are being started in Colombia and Brazil.

Functions of Cooperative Stations

The functions of the stations include technical agricultural research regarding the development, propagation, and distribution of superior planting materials of complementary tropical crops; extension work to interest farmers in growing these crops, once their feasibility has been established, and in improving their living and farming standards; and cooperation with public health and colonization agencies, as well as other agricultural agencies in the countries in which the stations are located.

This and other technical collaboration in agriculture between the United States and other American Republics is authorized by Public Law 63 of the 76th Congress, enacted in 1939. Congress has been considering legislation to place these operations upon a global basis and to authorize the interchange of persons, knowledge, and skills between the United States and all other countries.

The program under which the cooperative agricultural stations and projects are operating has received warm support from officials in countries where the work is progressing. President Prado of Peru has referred to the Tingo Maria station in his country as an outstanding example of international cooperation in the Western Hemisphere. President-elect Ospina of Colombia has stated that his country needs the assistance of United States technicians in developing its agriculture.

The principal contribution of the United States Government to the operation of a cooperative station is the skill of the technicians assigned to it. The stations are constructed at the expense of the country in which they are established. Its investment is about $4 to $1 spent by the United States.

The training of foreign technical personnel is divided into two parts: that which must be given in the United States and that given in other cooperating countries. Emphasis has been placed initially upon the first part, in order to provide a nucleus of trained persons who may return to their countries and carry on advanced research. Emphasis on the second part will increase as trained personnel and plant facilities become available in other countries. During the fiscal years 1944, 1945, and 1946, 84 agricultural scientists and officials from 17 of the other American Republics each received a year of in-service training or formal study or both in the United States through cooperation of Department of Agriculture agencies.

Visiting scientists assisted by the Department of Agriculture in their farm studies in this country have come not only from other American Republics, but also from other parts of the world, such as India, China, the Middle East, and Europe.

United States Missions to Foreign Countries

The Departments of Agriculture and State have cooperated in sending agricultural missions to the Near East, to China, and to the Philippine Islands. These missions, composed of agricultural technicians, assist the governments of the countries visited in developing agricultural programs. They may also offer suggestions with regard to emergency problems. Another purpose is the discussion of possible future agricultural collaboration with the United States.

The Near East mission visited Egypt, Lebanon, Syria, Iraq, and Arabia in response to invitations from those countries, and cooperated with FAO officials in an agricultural survey in Greece. It was headed by Dr. Franklin S. Harris, president of Utah State Agricultural College. Dr. Claude B. Hutchison, vice-president of the University of California and dean of its College of Agriculture, and Dr. Leland E. Call, dean of agriculture of Kansas State College were chiefs respectively of the China and Philippine missions.

FOOD AND AGRICULTURE ORGANIZATION

Last October the United States became a charter member of the Food and Agriculture Organization of the United Nations. During the remainder of the year it participated fully in the work of that agency. These activities were among the most significant and promising of the year's developments.

In our times few of the great problems in food and agriculture are solely national. Neither insect pests nor plant and animal diseases respect boundaries. Gains in technology that help farmers in one part of the world usually can help those in many others. The unsalable surpluses of one country affect world markets of other large producing nations and at the same time represent urgently needed supplies of food and clothing in other areas. The Food and Agriculture Organization represents an effort by many nations to work together, as well as separately, to solve some of their common problems.

The chief ends which member nations hope to further through FAO are: 1. Raising levels of nutrition and standards of living of the people under their respective jurisdictions; 2. Securing improvements in the efficiency of the production and distribution of all food and agricultural products; 3. Bettering the conditions of rural populations, and thus contributing toward an expanding world economy.

FAO was designed to promote these objectives through (1) collecting, analyzing, and disseminating technical and economic information, (2) making recommendations to member governments and to other international organizations, and (3) furnishing technical assistance at the request of member governments.

The United States Government has taken a keen interest in FAO from the beginning. The meeting at which plans for the organization first took shape—the Hot Springs Conference on Food and Agriculture in 1943—was held in this country at the invitation of President Roosevelt, who said in a letter to conference members, "the problems with which this conference will concern itself are the most fundamental of all human problems—for without food and clothing life itself is impossible." After Hot Springs the United States held one

of the seats on the Executive Committee of the Interim Commission which prepared the constitution and otherwise laid the ground work for a permanent organization.

The Food and Agriculture Organization was formally established October 16, 1945, at Quebec, Canada. The United States delegation to that conference was headed by the Secretary of Agriculture and included representatives of the agricultural committees of both houses of Congress, the four national farm organizations, the land-grant colleges, and the National League of Women Voters, as well as experts in various fields from the Agriculture and States Departments and other interested agencies of the National Government.

President Truman sent a special message. "The United States is eager and proud to take its full part in your efforts," he said in part, "The success of this all-important first step in the life of the Food and Agriculture Organization is the primary aim of my country's delegation. Its members come to this conference prepared to work together with the delegations of other nations for the good of all, and to bear their full shares of the responsibility for a successful outcome."

In keeping with that message, members of the United States delegation took an active part in both the plenary sessions and the committee work of the first FAO conference; and three of them served, respectively, as chairman of the Nominations Committee, chairman of the Committee on Forestry and Forest Products, and vice chairman of the Committee on Agriculture. Another member of the delegation was named to the 15-man Executive Committee of FAO. In addition, the United States loaned the services of many of its experts to the technical secretariat of the conference.

Beginning of Long-Range Operations

Sir John Boyd Orr, Scottish nutritionist, research administrator, and farmer, was chosen as FAO's Director-General. During the period ending July 1, 1946, the organization set up its temporary headquarters in Washington, built the nucleus of a staff, and began to plan and carry out its long-range operations. A major task which was practically completed by the end of June was a comprehensive world food survey. This basic study, based on data from 70 countries representing 90 percent of the world's population, presents estimates, country by country, of available food supplies just before the war, and matches them against nutritional targets which represent goals for diet improvement. Similar long-range appraisals on forestry and fisheries also were begun during the year. At the request of the Government of Greece, FAO sent a mission to that country to make a broad study of agriculture and fisheries there and recommend long-term developments.

FAO convened the Special Meeting on Urgent Food Problems that was held in Washington last May, and prepared economic and technical material for use at that conference, including an appraisal of the world food situation for 1946–47. FAO is supplying the Secretariat of the International Emergency Food Council, which, in line with a recommendation of the Washington meeting, replaced the Combined Food Board as an allocating agency and will continue in existence for the duration of the world food emergency. In line with

another recommendation of the Washington meeting, FAO began work on proposals for a long-range world food policy designed to prevent both shortages and surpluses of food and other farm products.

Support by United States Government

In addition to its regular contribution as a member of FAO—$625,000 for the first financial year, scheduled to rise to $1,250,000 a year thereafter—the United States has supported and advanced the work of the organization in a number of ways. Facilities of the Department of Agriculture—notably of the Department's Office of Foreign Agricultural Relations and the Library—and of other Government departments, have been placed at the disposal of FAO. Trained personnel has been loaned or temporarily released to FAO for such special assignments as preparation of the World Food Survey and the short-range appraisal of the food situation, and the mission to Greece. Through the Federal-State Extension Service and its press and radio information offices, the Department of Agriculture has kept the public informed as to problems and progress in international aspects of food and agriculture. Other departments have carried on similar work. A national FAO committee, representing interested departments and agencies of Government, was created by the President last March to promote and coordinate full national participation in the work of FAO with the aid of an advisory committee representing nongovernmental organizations such as farm, labor, and business groups, educational institutions, and citizens' associations.

The cooperation is continuing. Over and above its general contribution to greater world unity, the success of FAO means much to the farmers and other people of the United States. This is particularly true in the field of marketing. Naturally, we still can learn a great deal from other countries about the science of nutrition and agricultural production, and even more about fisheries and forestry. But on a short-range basis it is likely that this country will give more than it receives in the exchange of purely technical information. Our greatest problem in the years ahead will be to find markets for all we can produce efficiently—industrial goods as well as farm products. Here we have much to gain through cooperation with other nations through FAO as well as through other international organizations for developing world trade. Already FAO has begun to develop an economic information service that will measure and locate food supplies and potential markets more accurately than has been possible before. Through its efforts to improve distribution and increase productivity and raise living levels all over the world, FAO can help us find the outlets we must have if we are to enjoy continued prosperity based on full production.

THE INTERNATIONAL EMERGENCY FOOD COUNCIL

The Combined Food Board was replaced by the International Emergency Food Council on July 1, 1946. The Combined Food Board was a wartime agency through which arrangements were made to utilize to best advantage the food resources of the allied nations. The United States, the United Kingdom, and Canada were represented

on the Board itself. Before peace came, the Board's commodity committees were expanded to include representatives of major exporting and importing countries. The persistence of serious world food shortages made it necessary for the Combined Food Board to continue its work after the termination of hostilities.

At the Special Meeting on Urgent Food Problems, convened by the Food and Agriculture Organization of the United Nations on May 20, it was agreed that emergency machinery to deal with the distribution of foodstuffs in short supply would continue to be necessary for the duration of critical world shortages. A recommendation was approved for the establishment of the International Emergency Food Council, which was expected to operate for at least 18 months. The new agency held its first meeting on June 20, and officially replaced the Combined Food Board on July 1. Nineteen nations accepted membership at the outset: Australia, Belgium, Brazil, Canada, Chile, China, Cuba, Denmark, France, Greece, India, Netherlands, New Zealand, Norway, Siam, Turkey, Union of South Africa, the United Kingdom, and the United States. The Council elected the following nine nations to membership on its Central Committee: Argentina, Australia, Canada, China, Denmark, France, India, the United Kingdom, and the United States.

The transfer of functions from the CFB to the IEFC was facilitated by the fact that CFB commodity committees included representatives of major exporting and importing countries. The IEFC drew its initial membership from nations represented on CFB commodity committees.

Best Utilization of Scarce Foods Sought

Like that of the CFB, the basic purpose of the IEFC is to seek the best possible utilization of scarce foods during the world food crisis. On the basis of the best available information regarding supplies from exporting countries and the minimum requirements of importing countries, the Council develops recommended allocations, through its commodity committees, which represent the highest possible measure of agreement regarding the pattern of distribution. The objective is to maximize exportable supplies and to promote that distribution which will most effectively alleviate the world food crisis. Although the Council has no mandatory powers, each member country is expected to abide by the Council's recommended allocations since it has agreed to such recommendations through its representative on the Council and its commodity committees.

The Council will continue for the duration of the shortage of basic foodstuffs.

AMERICAN AGRICULTURE'S FIRST POSTWAR YEAR

As the foregoing chapters of this report have shown, the overwhelming demand for food did not cease with VJ-day. Military takings tapered off, but relief needs mounted. The slogan of the early war years, "Food will win the war and write the peace," proved to contain a large measure of truth. High demand abroad matched high demand at home. In the United States funds that would have

gone into other forms of consumption goods had they been available tended to swell food expenditures.

Wage earners labored hard during the war years; they received higher wages than ever before. Not all of them accumulated nest eggs. A Nation-wide study made by this Department for the Federal Reserve Board in the first quarter of 1946 revealed that 20 percent of our families (spending units) had no bank deposits or bonds and were dependent upon current earnings. Half the Nation's families accounted for only 4 percent of the Nation's personal holdings of bank deposits and bonds. But limits to civilian food demands had apparently not yet been reached.

The Nation's farmers had little respite from the tempo of wartime production. Adjustments that would abate the intensity of wartime cropping and reduce the drain on fertility reserves had to be postponed. The agricultural plant of 1946 may be briefly described.

Acreage of land in farms remained relatively stable during the war years, but the use of cropped acreage shifted in response to wartime needs. In 1946 the relationship between intertilled, close-growing, and sod crops was not greatly different from that of 1945. Farmers had not yet made marked shifts from wartime cropping patterns.

Spectacular expansion in soybeans and flaxseed took place in the war years. Acreage planted to these crops in 1946 was still well above prewar levels, but the July crop report indicated downward trends from peak averages. Corn was generally more profitable than soybeans in areas adapted to both crops. Moreover, soybeans were erosive when grown on rolling land. Flaxseed, an uncertain crop in many areas, declined because farmers were reluctant to produce this crop with wartime compulsion past.

Sugar-beet acreage in 1946 regained the average level of the period 1937–41, though it increased 19 percent over the 1945 planted acreage. An increase in the price support placed this crop in a more favorable position with regard to alternative crops. An easier labor situation and improved availability of labor stimulated beet production.

Continuing high demand for tobacco resulted in an 8-percent increase in acreage over that of 1945.

Most noticeable among the grains was a 4-percent increase over 1945 in planted acreages of both wheat and oats. The world-wide need for wheat, continued high prices, and weather conditions favorable for increasing the oat acreage were main factors. Little change in corn acreage was evident but early indications pointed to a crop of record size.

Livestock, Feed, Machinery, and Fertilizers

Livestock numbers decreased from the wartime peaks. Milk production was expected to be about 4 billion pounds less than the 122 billion pounds produced in 1945. Egg production was not greatly different from that of last year, but chickens and turkeys raised were between 10 and 15 percent less than in 1945. The spring pig crop was comparable to that of a year earlier, the number of fall pigs much less.

A tight feed situation, caused by the soft corn crop of 1945 and the purchase of grains for relief feeding, influenced these downward

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trends, particularly with hogs and poultry. Prospects of a bumper corn crop indicated it might be possible once again for corn to flow freely into deficit areas, but increasing prices of feed grains were a retarding influence.

Less than one in six of our people lived on farms at the opening of this year. The total farm population, as noted in detail elsewhere in this report, has been drifting steadily downward since 1933, but 1946 is seeing a reversal of this trend. In the first half of the year slightly more farm workers were available than in the corresponding period a year earlier. An increasing number of veterans are returning to the farm and greatly improving the quality of the farm labor force. Shortages of farm labor were not a widespread deterrent to agricultural production in 1946.

Production of farm machinery, machinery attachments, and repair parts during the first half of 1946 was considerably below that of the same period of a year earlier. Labor difficulties in farm-machinery plants and in industries that supply materials were largely responsible. Shortages of component parts gave trouble. But over-all agricultural production in 1946 will probably not be seriously hampered, and fairly adequate farm-machinery supplies will be available in 1947. Production of motortrucks, automobiles, and auto and farm-implement tires improved as the 1946 season progressed.

Consumption of fertilizers on 1946 crops was roughly double that of the average for the prewar period 1935–39. Many areas not previously accustomed to its use learned the value of fertilizer in increasing yields and improving quality of crops during the war. As a consequence, demand for fertilizer exceeded the supply. Shortages, however, were not a serious limiting factor on crop production in 1946.

Farmers were not prevented from meeting 1946 crop goals because of a lack of lumber, though supplies were far short of meeting all demands. The steel and coal strikes during the first half of the year affected supplies of fencing, nails, bale ties, roofing, pipe, and other products used by farmers. Much needed new farm construction had to be postponed. Supplies of insecticides and fungicides, particularly arsenicals and copper chemicals were affected by the labor situation, and the tobacco industry could not fill the increased demands for nicotine compounds. Most of the shortages of insecticides and fungicides, however, seemed likely to be largely overcome by 1947.

FARM TECHNOLOGY STILL ADVANCING

Our farms possess tremendous production possibilities. Twice in the last 25 years farmers have shown their ability to use them for war needs. Each time the output, measured in tons of food and fiber, has been surprisingly large.

Since 1939, farm output of food, fiber, and tobacco for human use has been considerably larger than the average for the 5 prewar years 1935–39. In 1944, the last full year of the war, output was 29 percent higher than the prewar 5-year average. Each farm worker produced 40 percent more for human use in 1944 than he averaged in 1935–39.

This accomplishment resulted from long days of work in the fields and barns with machines, tools, land, and livestock that yielded well for each hour of labor spent. Good producing weather helped too,

but if the effect of better-than-average weather is eliminated, farm output in 1944 was still one-fifth larger than the prewar average.

Two major technological developments made possible this production record, achieved in the face of a decreasing farm-labor supply. First, soil conservation, better seeds and plants, improved strains of livestock, more fertilizers and lime, and less waste in storage and transportation facilitated higher production. Secondly, more and better labor-saving machines and tools enabled fewer workers to do the farm job.

A contributing factor was the displacement of horses and mules by tractors and other power machines. With less land required for the production of horse and mule feed, more was available for the production of food and fiber for human use. Seven million crop acres were thus released during the 5 high-yielding war years. Fifty-two million crop acres were thus released in the last 25 years.

Foundation Laid for Higher Yields

Prewar programs of soil conservation, which included greater use of cover crops, of contour and strip-crop farming, of terracing, and of soil-conserving crops, laid a foundation for higher yields per acre. Some of these practices continued to increase in the war years. Acreage of the principal cover crops in 1944, for example, was more than three times the 1935–39 average. Despite the pressure for food, farmers found it necessary to increase the acreage of intertilled crops by only 4 percent from 1935–39 to 1944.

Abundant supplies of commercial fertilizers and agricultural lime enabled farmers to increase their production and at the same time hold much of the prewar gain in conservation farming. In 1944 total consumption of fertilizer, in terms of plant nutrients, was 80 percent greater than the 1935–39 average; farm use of liming materials increased 250 percent.

Adoption of improved crop varieties, which had been increasing for several years, was important. Use of hybrid seed increased the yield of corn over open-pollinated seed by about 20 percent and added around 400 million bushels to the 1944 corn crop. New varieties of oats adapted to conditions in the Corn Belt and Lake States and rust-resistant, improved varieties adapted to the South increased oats production. Shifts to the more productive and nutritious legume hays, and improvement in the carrying capacity of pasture lands took place extensively.

Curbing Outbreaks of Animal Diseases

Science and the vigilance of farmers effectively curbed all major outbreaks of animal diseases. Technicians provided new materials and methods for controlling insects. Production of meat animals and animal products per unit of breeding herd increased considerably. Milk production per cow and egg production per hen increased during the last 25 years at an average rate of about 1 percent a year. Scientific, commercialized broiler and turkey production increased substantially. Better sanitation and more attention to saving pigs resulted in reduced pig and mature-animal losses.

Labor-Saving Machinery

Modern farm tractors and other farm machines saved labor and facilitated more timely and more thorough farm operations. Farmers are now doing a given amount of work with about one-fourth less man-hours than would have been required 25 years ago. Largely attributable to farm mechanization, this saving in labor owes something to other technological developments, such as higher yielding crops, greater meat and milk production per animal, improved methods of handling farm enterprises, and elimination of some farm operations.

Maximum Capacity Not Yet Attained

Yet maximum food-production capacity on farms has not been attained. Further replacement of horses and mules by tractors will release more land for food production. Cropland can be increased, if necessary, by land clearing, drainage, and irrigation. The use of improved varieties and strains of seeds, of soil-improvement practices, and of fertilizers can be increased still more. New farm machines and tools and improvements in old types are becoming increasingly available. These facilities will turn out more work in less time, and with less waste, and will give a better quality of product.

FARM MACHINERY

In spite of machinery-production slow-downs caused in 1946 by strikes and shortages of materials, the farms of the United States now have more tractors and tractor machines than ever before. Output in this kind of farm equipment has recently exceeded the mere replacement need. Nevertheless, it has fallen below the total requirement, which includes tractors needed to offset losses in work animals. The tractor-replacement need in 1946 was probably only about 100,000. It would have taken an estimated additional 140,000 tractors to offset the loss of work stock.

Numbers of horses and mules 3 years old and older on farms in 1946 were about 1.4 millions below the 1942 numbers and about 600,000 fewer than in 1945. The reduction in 1945 was greater than in any previous year except 1936 and implied an offsetting need for 140,000 tractors on the assumption that for drawbar work one tractor will displace about 4¼ work animals. In the year ended June 30, 1946, the number of new tractors available to farmers for all purposes was only about 160,000. Figures for the calendar year 1946 may exceed present expectations; even so, the tractor production will not cover the total demand.

Farm mechanization continues, however, to advance in the United States, notably in the use of power machines and attachments. Many innovations have been adopted widely. The equipment of tractors with rubber tires has produced tremendous changes, particularly in tractor uses. Equipped with rubber tires, the tractor gains speed and mobility; it becomes handy for light jobs such as haymaking, in which animal power formerly had the advantage. Along with improvements in design and economy, the rubber-tired tractor gives wider uses, more hours of work per year, and more opportunities to

dispense with manpower. Consequently, this type of tractor has been chiefly responsible for the increase in tractor numbers.

Machines common on farms in prewar years, such as the combine, the mechanical corn picker, the milking machine, the tractor mower, the windrow pick-up baler, and the cotton stripper, are increasing rapidly in numbers. Mechanical cotton strippers, used originally only in subhumid areas, have been experimented with to a limited extent in humid areas. Machines not common on farms in prewar years, such as the mechanical cotton picker, the beet harvester, the beet loader, the cane harvester, the manure loader, the stacker loader, and the forage harvester, are climbing out of the developmental stage. In some of them the war years saw marked improvements. The mechanical cotton picker was first offered for direct sale to farmers in 1944, and some of these machines are now in operation on commercial farms. The potato picker, the manure loader, and the forage harvester have jumped in popularity.

Utilization of Machines

Measures of utilization exist for some important farm machines, and they tell a striking story. For example, the grain combine in 1945 harvested about 75 percent of the wheat acreage and about 40 percent of the oats acreage, as compared with 50 and 15 percent, respectively, in 1938. Combine harvesting last year took care of 11 million acres of soybeans for beans, as compared with 3 million in 1938. In the war years the self-propelled combine came widely into use. Along with grain-drying plants, it promoted greater use of combine harvesting in the humid rice areas.

Corn pickers on farms increased about 30 percent in number between 1942 and 1946, and the average machine covered a considerably increased acreage. Last year in many areas of the Corn Belt more than two-thirds of the corn crop was machine-picked. Tractor mowers did perhaps 50 percent of the hay cutting in 1946; in 1939 the percentage was 15. Milking machines on farms have doubled in number since 1942.

In 1946, farmers could purchase self-tying windrow pick-up balers of either the twine or the wire type. Since 1939, hay baling has almost doubled, chiefly from the increased use of the windrow pick-up baler. This machine took care of 14 percent of the 1944 crop as compared with less than 3 percent of the 1939 crop.

Mechanization of sugar production has increased in both the beet and cane areas. Some types of sugar-beet harvesters turn lifting, topping, and loading into a single operation. In the cane-sugar fields, cane harvesters and cane loaders are coming increasingly into use. More of these machines were available in 1946 than in any previous year.

FARM-LABOR CONDITIONS IN 1946

Demobilization and population shifts occasioned by reconversion have significantly changed the number and types of farm workers. By the middle of 1946 the number of persons working on farms was 11,586,000, or nearly a half million more than a year earlier.

The increase over 1945 levels, which continued each month after the early spring of 1946, contrasted sharply with the fairly steady decline of the last few years. Between 1940 and 1945 this decline averaged 150,000 a year. If gaged by the levels for June and July, agricultural employment in slightly less than 1 year after cessation of hostilities had regained 41 percent of the decrease recorded between 1940 and 1945.

For several decades prior to 1940, as farm-labor productivity increased from mechanization and other reasons, there had been a gradual net decline in the number of persons working on farms. Mechanization proceeded during the war and farmers adopted other practices which increased the production per worker. It is therefore doubtful that the number of farm workers will need to rise to its prewar level again.

Considerable change has taken place in the composition of the farm working force since VJ–day. The net decrease during wartime in the number of persons working on farms was less than the gross loss of experienced farm hands, who often had to be replaced with women, youths, older persons, or specially recruited nonfarm people. During 1943, for example, the farm working force included 2.1 million women who were housewives and 1.1 million youths of school age. In 1945 high-school-age youths from 14 to 17 made up one-fifth of all persons who did hired farm work.

By July 1946 the return to agriculture of World War II veterans had reached about 1 million and the proportion of men among agricultural workers had risen significantly. The entire increase of 485,000 over July 1945 took place among males. In addition, veterans replaced at least 300,000 other workers, probably most of them less able-bodied. Some increase in veterans working on farms continued after the midsummer, but at a greatly reduced rate, since rapid demobilization had been over for several months. Other changes in the composition of farm work forces during 1945–46 included the removal of the 71,000 prisoners of war, and a reduction of 20,000 in the number of imported foreign workers.

Farm Wage Rates Highest on Record

The improvement in the composition of the farm working force, and the increase in the total farm labor supply have not weakened agricultural wage levels. On the contrary, a rising cost of living, advances in industrial wage rates and in farm prices, and ample nonfarm job opportunities have contributed to maintain an upward trend in farm wage rates. Farm wage rates are now the highest on record. The trend, as in nonagricultural wages, has been upward since VJ-day. Wage rates of hired farm workers in the United States on July 1 were 8 percent higher than a year earlier. Average farm wage rates without board were $4.84 per day and $106 per month.

It should be noted, however, that the wartime and postwar advances merely prevented a widening of the spread between farm and nonfarm wages. Earnings of hired farm workers remained far below those of nonfarm workers. In March 1945, 68 percent of male hired farm workers in the United States received less than 40 cents an hour in cash wages, the minimum set for nonagricultural workers covered by the Fair Labor Standards Act. As of January 1944, only about 8 per-

cent of all nonagricultural employees received straight-time hourly rates of less than 40 cents. Since then straight-time rates in industry have risen.

Farm wages rose seasonally during 1945 from an average of 35 cents cash wages per hour in March to 48 cents in September. At the peak of the 1945 season, the daily cash wages earned by farm workers under all types of rates (month, day, hour, piece rates, etc.) averaged $4.40. Cash farm wages varied by major regions from $2.90 daily in the South to $6.80 in the West. Much hired farm work is intermittent, hence daily wages tend to overstate earnings throughout the year.

Cash farm wages received during 1945 by all persons who did any hired work in the year averaged $284. Male farm workers employed during the entire year earned the median cash wage of about $850. This figure may be compared with the median of $336 earned by hired farm workers employed for 12 months in 1939.

FARM-POPULATION CHANGES SINCE THE END OF THE WAR

Transition from war to peace economy has involved considerable redistribution of population in the United States. Naturally, this has affected both the number and composition of the population on farms.

Since the capitulation of Japan in August 1945, over 10 million men have been returned to civilian life from the armed forces and many others have migrated from their wartime residences.

The most important net change in the farm population since the end of the war has been the return of veterans to farms. By the end of 1945, 1 million men who had served in the armed forces since 1940 had been discharged and were living on farms. Some of them returned to farms before 1945, but the majority did so after VJ-day. As a result, the farm population showed a net increase during the year 1945 for the first time since 1933. The number of people living on farms was estimated in January 1946 as 25,990,000. This was 800,000 more than at the beginning of 1945.

Civilian migration from farms in 1945 was just equal to the civilian migration to farms, a marked departure from the usual situation. In the 25 years from January 1920 to January 1945 the net loss from farms through migration (not including men entering or leaving the armed forces) averaged 600,000 a year. Even during the 1930–40 decade, when migration was affected by the great depression, there was an average net migration from farms of approximately 375,000 persons per year.

Large Two-Way Movement

The net equality of civilian migration to and from farms during 1945 concealed a great amount of movement in both directions, especially marked in the latter part of the year. Estimates by the Bureau of the Census indicated that nearly 2½ million persons moved to farms from cities or from the armed forces in the 6 months after VJ-day, while slightly over 2 million persons moved away from farms during that period. Moreover, much of the migration to farms was not a

return to prewar places of residence. Among the 2.4 million persons who moved to farms from nonfarm areas and from the armed forces during this period only 1 million had been living on farms in 1940, and most of these were World War II veterans.

Crowded housing conditions in cities and greater availability of gasoline and tires were factors in the increased migration to farms. The return of veterans to the nonfarm population and their high marriage rates caused greater housing shortages in many cities than during wartime. When families moved to farms just for a place to live, they did not necessarily take up farming or farm work, though they increased the farm population as currently defined.

As demobilization proceeded, the number of veterans in the farm population increased. By April 1946, 1.3 million veterans of World War II were living on farms; by July 1.5 million. About 900,000 were in farm work; most of the rest had nearby nonfarm jobs.

The year of transition from war to peace did not bring the number of people on farms back to the prewar level. Spectacular changes such as those of the war period could be followed by a lull. Nevertheless the American population after new peaks of mobility may not completely settle down at once; it may manifest greater than prewar rates of migration for several years. Many people move several times in seeking postwar jobs and homes. Such repeated moving may increase the migration rates to and from farms. The urban housing situation and the preference of many for a rural environment tend to cause farmward migration among persons not connected with agriculture.

THE YEAR'S PRODUCTION

Aggregate crop production in the United States in 1946 exceeded the outturn of any previous year, on the basis of preliminary estimates. Food grains, feed grains, and truck crops were being produced in record volume. Total production of fruits and nuts (including a forecast of citrus fruits) was also in record quantity. Livestock products were produced at a high level, but below that of the past 4 years. Oil-crop production was below the desired level.

Conditions for seeding grains in the fall of 1945 were favorable over most of the country. More land was available for fall seeding, prices were generally good, 1945 had been a successful season, and the weather was favorable. The result was an increase in winter wheat acreage to the third largest total of record, despite decreases in North Atlantic and East North Central States, where wet fields and late harvesting of corn and soybeans prevented planting some of the intended acreage. Prospects at the beginning of winter were above average.

Unusually good progress in spring farm activities and vegetative growth resulted from an unseasonably warm March and favorable April weather. Fall-sown grains, hay, and pastures made an excellent start. Spring plantings were made under near-ideal conditions. Farm supplies of feed grains were mostly ample, except in the deficit-producing areas, so that liberal feeding and favoring weather resulted in record rates of production of milk and eggs. Only smaller numbers of milk cows and laying hens kept total production below record levels. Frosts in late April, affecting three-fourths of

the country, damaged fruits to varying extents. Other frosts in the West North Central States about May 10–13 checked growing spring crops and damaged alfalfa and fruits. Spring grains in the frosted area recovered well, with little apparent effect other than some thinning of stands and a set-back that offset to a large degree the early start gained in April. There was time to replant damaged flax. Fruits came through with less damage than had been feared.

Although heavy rains in May promoted rank growth of grains, meadows, and pastures, they also delayed soil preparation and planting of corn and soybeans in East North Central States and hindered harvest of grains and cultivation of row crops in much of the South. But as the season progressed, all these difficulties were overcome, even much of the effects of the very dry weather in the Great Plains. Yield prospects improved as the season progressed, largely owing to heavy test weights of grain. July and August weather was almost ideal for filling, maturing, and harvesting. Although August was too dry in some areas and too cool in others for the best development of corn and other late crops, pastures supplied abundant feed and the hay crop yielded well. Corn developed well generally and was mostly safe from frosts at average dates. However, dry weather reduced acreage and yields for grain in the northern, western, and southwestern fringes of the main Corn Belt.

The labor supply received some recruits as the season progressed and gradually became less of a restrictive problem. The supply of farm machinery, and especially of repair parts, had been a limiting factor in production at the start of the season but was augmented somewhat by harvesttime. With itinerant combine crews available for custom work and the weather favoring efficient use of available machines, the harvest moved at a rapid rate. So rapidly did the huge crops move to shipping points that elevators often were plugged and grain had to be piled on the ground. Transportation facilities were inadequate, temporarily at least, to handle the quantities awaiting shipment.

The combined acreage of all crops for harvest on August 1 was estimated at 346 million acres, only slightly (0.2 percent) less than in 1945. For the years since the period 1928–32, during which harvested acreages ranged from 351 to 362 million acres, the 1946 acreage is the largest except in the past 3 years. Farmers planted a larger aggregate acreage than was planned in March, but there were several significant shifts between crops. With a large carry-over of hay and a promising season for a new crop at hand, over a half-million acres intended for hay were shifted to other crops.

Taking full advantage of the favorable weather to plant at optimum dates, farmers planted much larger acreages than they had planned to spring wheat and oats. Conditions in the main flax-producing area were not favorable for that crop at seeding time and acreage was reduced by nearly 800,000 acres below intentions. Not quite all the intended acreages of corn, barley, rice, soybeans, cowpeas, and sugar beets were planted, but farmers put in more than the intended acreages of sorghums, tobacco, peanuts, beans, peas, potatoes, and sweetpotatoes.

The acreage in cotton, though still relatively very small, increased 3 percent over that of 1945. In the aggregate, crops for which goals had been set fell below the goals by a total of 14 million acres, or 4 per-

cent. Plantings of wheat, oats, rice, potatoes, and tobacco exceeded their goals. Of those under the goals, flax, rye, barley, beans, peas, soybeans, cotton, and sugar crops were notably low.

Major contributions to the largest aggregate volume of crops ever produced, on the basis of preliminary estimates, were made by record crops of corn, wheat, potatoes, tobacco, peaches, pears, plums, citrus fruits, and truck crops; near-record crops of oats, rice, peanuts, grapes, cherries, and sugarcane; and average or better crops of hay, flaxseed, sorghum grain, soybeans, buckwheat, sweetpotatoes, dry peas, apples, prunes, apricots, hops, and sugar beets. Production of broomcorn, dry beans, pecans, and particularly rye and cotton were below average.

Farmers harvested their third successive wheat crop of over 1 billion bushels and their second successive 1.5 billion bushel oats crop. The fifth successive corn crop of over 3 billion bushels was in prospect, with the aid of mostly favorable planting and growing conditions. About 67.5 percent of the acreage was planted with the higher yielding hybrids, with seven-eighths of the hybrid acreage in the high-yielding Corn Belt. The first tobacco crop in excess of 2 billion pounds appeared certain.

Even as the citrus crop from the 1945 bloom exceeded any previous crop, that from the 1946 bloom promises to top the previous year. Production of deciduous crops was large although the apple crop was a little below average. Production of commercial truck crops for the fresh market set new records of more than 9 million tons from over 2 million acres. The second largest supply of processing vegetables in history was available. The cotton crop of less than 9 million bales is one of the smallest in the century, owing to both a small acreage and a low yield per acre.

Total food-grain production was over 37 million tons—a million tons more than in 1945, when the previous high mark was set. Total feed-grain production of 128 million tons is 4 percent larger than in 1942, the previous record year. With a larger-than-average hay supply and a larger tonnage of other roughages, feed supplies were abundant. This was true, despite the relatively small carry-over stocks of feed grains. Since the number of livestock and poultry on farms has decreased during 1946, the supply of feed grains per animal unit was the largest in the 21 years of record.

Livestock and Livestock Products

Livestock and livestock products were produced in an aggregate quantity about 6 percent below that of 1944 and 1945 and 10 percent below the high mark of 1943. In each of the categories—meat animals, wool, mohair, dairy and poultry products—production was less than in 1945. It was estimated that nearly 43 billion pounds liveweight of cattle, hogs, sheep, and poultry would be produced in 1946, about 2 billion pounds less than in 1945 and 8 billion pounds less than in 1943. However, this would be more than in any year prior to 1942.

Hens on farms, even with their number steadily decreasing, laid as many eggs in the first 6 months of 1946 as in the first half of 1945. But shortages and high prices of feed resulted in lighter feeding and a lower rate of lay in the middle of the year. Nevertheless, production for the year was expected to fall only 3 to 4 percent below that of 1945, which was second only to the record year 1944.

With large storage stocks and a decreased need of eggs for processing, supplies for consumers were ample. Poultry meat, as in 1945 and the war years, did much to bridge the gap in meat supplies. With a reduction of about 4 percent in the number of cows milked, total milk production was expected to reach 119 billion pounds, 3 percent below the 1945 record volume. Production per cow was at a record level.

VICTORY GARDENS IN 1946

This was the sixth year of a national victory-garden program sponsored by the Department of Agriculture. During the war this program resulted in from 18½ million to 20 million victory gardens each year. About 6 million of these were farm gardens, the rest suburban and urban. Despite the necessary smallness of urban gardens, the amount of food produced was enormous. Victory gardens annually produced around 8 million tons of fresh vegetables. Along with home preservation, this greatly helped the Nation to meet wartime food requirements. Housewives in 1945 canned 3.4 billion quarts of fruits and vegetables. Nearly 90 percent of nonfarm households with gardens preserved fruits and vegetables.

After the war, it seemed possible the special drive for victory gardens and home food preservation might not be needed. The Department and the State extension services had long advocated more and better farm gardens, as well as home food canning; they would continue to do so. But there was a new element. Millions of urban and suburban people had developed a great interest in gardening, which needed to be maintained. It was a base on which to build a permanent home vegetable gardening and also a wider interest in home grounds and civic improvement.

As more became known about the food situation abroad, the American people realized they should conserve food. They realized also that they should produce and preserve as much as possible of their own food supply. Food would be thereby released for the food-shortage countries. Accordingly, the Secretary of Agriculture joined with the President in calling everyone with available garden space to have a good victory garden and to preserve as much food as possible.

A National Garden Conference held in Washington March 26–28 drew more than 100 persons, representative of garden clubs and committees, newspapers, magazines and the radio, the seed and horticultural trade, trade magazines, extension and other educational groups. Aided by suggestions developed in the discussions, the conference drafted recommendations which had a wide influence. A goal of 20 million gardens was set. Along with victory gardeners, home and community canners were asked to remobilize for an active campaign. The conference recognized the need for a long-time gardening program New housing developments, congestion in urban areas, slums and blighted areas, retarded home and civic improvements emphasized it.

The calls of the President and the Secretary of Agriculture and the recommendations of the conference reached farm and home gardeners generally. Press and radio programs supported the drive. Extension services made gardening and home food preserving one of their most important activities. The people responded vigorously, and seed sales jumped. A poll indicated 19,500,000 people intended to have victory gardens in 1946.

Weather and gardening conditions were more favorable than for some years. Gardeners benefited also from knowledge and experience gained during the war years. Millions of people, with no previous experience, had become skilled and successful in gardening. They had learned about planning and planting, and about fighting insects, disease, and droughts. As a result, victory gardens promised to produce more food than ever before. Many people had learned to eat more vegetables. Garden-fresh products gave satisfactions from which commercial producers should ultimately benefit.

Wide Response to Campaign

The campaign for preserving food in the home obtained a wide response. The rationing of canned food was over. But this had not been as big a factor in home food preservation as some had thought. In a survey 90 percent of the people interviewed said that the termination of rationing did not affect the amount they canned last year. There was a general feeling that the production of home supplies here would benefit peoples abroad. Many agencies that had cooperated with the Department in the garden and home food-preserving programs promised to continue.

Gardening can play an important role in rural and urban living. Gardening teaches something every day, and saves money. Also it is good fun. Supplemented by a small fruit planting, it enables many a family to achieve the desired nutritional standard of four to seven servings of fruits and vegetables daily. Other advantages include benefits to health and improvement of lawns, flowers, trees, and grounds. National garden programs encourage widespread appreciation of these facts.

THE FARMERS' EARNINGS IN 1946

It seemed from indications in August that the net income of farm operators in 1946 might be as much as 8 percent greater than that of 1945. Net income is what the farmers have left after subtracting their expenses of production from their gross income—that is, the amount available for farm family living, savings, etc.

Production expenses for 1946 may run about 11 percent above those of 1945. Some of the items involved may be noticed.

Expenditures for purchased feed, for example, will be higher, partly because feed prices have risen and partly because the farmers in the first half of the year fed their livestock more liberally. Expenditures for hired labor will be greater than in the previous year, reflecting a slight increase in the number of hired workers employed at higher wage rates.

Costs or charges for farm maintenance and depreciation will average higher, in part because farmers are now able to obtain larger supplies of farm machinery and motor vehicles. Total costs of operating farm motor vehicles were rising during 1946. Expenditures for fertilizer and lime also were above those of 1945, since both the amounts used and the prices had increased.

In addition, farmers in some parts of the country will pay higher taxes for local government, the expenses of which have increased. On the other hand, as noted elsewhere in this report, interest payments on farm mortgages should decline slightly, in line with reductions by farmers in their mortgage debt.

But because of these changes in production costs, the net income to farm operators increased slightly less than the gross farm income. Cash receipts from marketings, which constitute the greater part of the gross farm income, may run as much as 9 or 10 percent over 1945. The same percentage gain appeared in early estimates of the 1946 value of farm products consumed in farm households, so that American farmers over-all gross farm income—from sales, home consumption and government payments—is expected to show an increase of about 10 percent in 1946 as compared with 1945.

In dollars the cash receipts from farm marketings may run two billions above last year's 20.8 billions. Considerably more of the increase will come from marketings of crops than from marketings of livestock and livestock products.

Cash from marketings of crops may exceed those of 1945 by as much as 16 percent, largely as a result of increased returns from wheat, feed crops, and cotton. Some increase is likely in the receipts from livestock and livestock products, but the percentage gain will be smaller. In this branch of agricultural marketings meat animals and dairy products will be chiefly responsible for the improvement.

Government payments to farmers are likely to be slightly higher than those of 1945.

In physical volume the marketings may be about the same as those of 1945. A higher volume of crop marketings will be offset by a smaller volume in livestock and livestock products. Volume increases will be notable in wheat and vegetables, while marketings of cattle and calves, of poultry and eggs, and of tobacco may decrease.

Year of Striking Price Developments

The year was one of striking developments on the price front. Prices received by farmers for all commodities are expected to average about 10 percent higher than in 1945. Most of the increase took place following the lapse of price control after June 30. Farm prices in the first half of the year averaged about 4 percent over the 1945 average.

Average prices received by farmers increased sharply in July, and for that month were 18 percent higher than in July 1945. It was expected, however, that reinstatement of price ceilings on some commodities after August 20, along with record production of feed grains, would cause farm prices to recede somewhat during the fall months, though not down to the level of 1945.

Supports of other commodities at the statutory minimum seemed sufficient to encourage an adequate output in a balanced production program. In fact during the first half of the year most of these commodities pressed upward against the ceilings rather than downward against the supports. Only a few commodities required active Government price support. Among these were potatoes, referred to more extensively in other parts of this report.

Price Supports in 1946

This was the sixth year of our farm price-support program. Begun in 1941, the program has encouraged production and protected farmers from price declines. After VJ-day it seemed our price supports might need to put more emphasis on the second purpose; but acute world shortages developed in food grains, fats and oils, sugar, livestock, and livestock products. Accordingly, as in the war years, the support program again primarily encouraged production.

Support prices of several commodities were maintained well above the minimum required by law. In this category were sugar beets, sugarcane, flaxseed, soybeans, and specified varieties of dry edible beans. (The minimum support price required for commodities for which price supports are mandatory is 90 percent of parity.)

As noted elsewhere, extensive purchase and diversion operations were necessary to support the prices of early potatoes. It seemed likely that growers in late-crop areas would rely heavily on the loan program.

An anticipated egg surplus failed to develop. Large export demands developed for dried eggs, and during the spring and summer the Government purchased approximately 100 million pounds—equivalent to 10 million cases. Partly as a result of this buying, market prices for eggs averaged moderately above the support levels.

The Department continued to buy wool at prices substantially the same as those of 1945; it resold wool from Government stocks at prices more nearly competitive with the prices of imported wool.

Support prices for certain commodities, such as vegetables for canning and fruits for canning and drying, are not mandatory. Increased production of these commodities was an urgent necessity in the war years, both for our armed forces and for military and civilian use by our allies. Accordingly, support prices for a wide variety of commodities were established. Needs have since greatly declined, and in consequence certain of the nonmandatory price supports have been discontinued.

In other respects the support-price program for 1946 closely resembles the program maintained in 1945. As required by law, basic commodities again have support through loans at 90 percent of parity or 92½ percent in the case of cotton. The basic commodities are corn, wheat, cotton, peanuts for nuts, rice, and tobacco.

The Department is continuing to support the prices of certain nonbasic commodities. In the war years, under the Steagall amendment to the Price Control Act, the Department specifically asked farmers to increase their output of these commodities, and announced price supports at or above the mandatory 90 percent of parity. These commodities are still being supported.

The Steagall commodities include hogs, eggs, butterfat, milk, chickens (except chickens 3½ pounds or less and broilers) turkeys, specified varieties of dry edible beans and peas, soybeans for oil, flaxseed for oil, peanuts for oil, potatoes, cured sweetpotatoes, and American Egyptian cotton.

Oilseed crops, dry beans, and peas are being supported at levels above 90 percent of parity, because prospective needs are high. Other nonbasic commodities, notably hogs, eggs, potatoes, and American

Egyptian cotton, have supports designed to assure the minimum 90 percent of parity to producers.

Price supports were continued during 1946 for certain nonbasic commodities not covered by a public request for expanded production. In such cases the support is not mandatory. The commodities covered include wool, gum naval stores, sugar beets and sugarcane, oats, barley, grain sorghums, designated winter cover-crop seeds, and certain hay and pasture seeds. Loan rates for oats, barley, and grain sorghums are based on the loan rates for corn and feeding values relative to corn. They serve to round out a comprehensive feed-grain support program. Supports for most other commodities in this group are intended to encourage production and offset existing or prospective shortages.

The Parity Ratio in 1946

Prices received by farmers during 1946 will average substantially above parity for the fifth consecutive year. During January–June 1946 the index of prices paid by farmers (including interest and taxes) averaged 182 percent of the 1910–14 level, compared with 211 for the index of prices received. The parity ratio was 116. In July the index of prices paid jumped to 199 and prices received to 244, raising the parity ratio to 123. For 1946 as a whole the parity ratio will probably average in the neighborhood of 115, about the same as in 1944 and 1945 but slightly less than the record level of 119, reached in 1943.

AGRICULTURE'S BALANCE SHEET

As of January 1, 1946, agriculture could be classed as a 100 billion dollar industry. During the year 1945 the value of its total assets rose from about 91 billion dollars to nearly 102 billions. The combined value of farm real estate, crops, livestock, and farm and home equipment increased from approximately 75 billion to over 81 billion dollars between January 1, 1945, and January 1, 1946. During the same period farmers' financial assets such as currency, bank deposits, and Government bonds grew from an estimated 16 billion dollars to 20 billions.

Accompanying this upward trend during 1945 in the value of assets was a reduction in liabilities. Although it showed a smaller decrease than in the year previous, farm-mortgage debt declined to 5,081 million dollars, down nearly 4 percent for the year and 23 percent since January 1, 1940. Mortgage debt not only decreased less in total during 1945 than in previous war years, but in 20 States it actually increased. Non-real-estate debt owed by farmers to principal financing institutions (exclusive of loans guaranteed by the Commodity Credit Corporation) increased 3 percent, to 1,672 million dollars.

The ending of the war did not curb the economic forces that in the war years had increased the value of agriculture's assets and decreased its liabilities. These forces produced a further increase in the equities of all types of proprietors to 93,185 million dollars, or 11,321 millions more than on January 1, 1945. These equities amounted as of January

1 last to 92 percent of the total assets. Proprietors included tenants, absentee landlords, and even stockholders of farm corporations; but owner-operators held the predominant interest. Equity held by creditors, which as indicated, represented only 8 percent of the value of all assets, may be compared with the 19 percent interest held by creditors only 6 years ago.

Physical Assets Show Greatest Increase

Of all the assets used in agriculture, 81,472 million dollars, or roughly 80 percent of the total, are physical. Farm real estate, valued at 56,584 million, is the biggest item by far. This asset rose in value during 1945 by about 13 percent. Except for 1919 and for the year ended March 1944, this was the greatest increase in any one year on record. By March 1, 1946, the index of value per acre of farm land had risen 71 percent above that in the prewar period 1935–39. This about equals the World War I increase of 70 percent from the average of 1912–14 to the peak in 1920.

Notwithstanding the close similarity in the rate of increase, present levels are still somewhat lower than the highs of World War I. The index (1912–14=100) for 1946 was 142, as compared with 170 in 1920. So far, the wartime rise in land values has been due almost wholly to an increase in price. In physical condition the Nation's agricultural plant has not improved. Probably it has deteriorated.

The value of physical assets other than farm real estate totaled 24,888 million dollars on January 1, 1946. Nearly 39 percent of the value of these non-real-estate physical inventories consisted of livestock, 25 percent was crops, 19 percent was machinery, and 17 percent was household equipment. These assets as a class increased in value from January 1, 1945, to January 1, 1946, by 513 million dollars, or 2 percent. Livestock showed the largest increase as a result of higher values per head. This item increased nearly 800 million dollars; whereas increases in the value of machinery and household equipment were nominal. Crops on hand showed a small decline in value, because price increases were not sufficient to offset the decline in the quantities.

Significance in Expansion of Financial Assets

Ordinarily the savings of farmers go largely into the farm business, with holdings of cash, bank deposits, and securities kept at a minimum. However, during the recent years, because or rising incomes and wartime restrictions on some types of expenditures, considerable accumulation has taken place. Financial assets now constitute about a fifth of the value of all assets in agriculture, and reached an estimated total of 20,050 million dollars on January 1, 1946. Deposits and currency have increased by about one-fourth; United States savings bonds by slightly more. Investments in farmers' cooperatives also have increased.

Naturally, the position of individual farmers varies. Preliminary information indicates that liquid assets are in the hands of a comparatively small proportion of the farm population. Apparently, 10 percent of the farm operators own 70 percent of farm operators' demand deposits, whereas about 50 percent hold no deposits. Apparently

10 percent own three-fourths of the United States savings bonds held by farmers. As with demand deposits, about half the operators own no United States savings bonds. Many heavily indebted farmers have low cash reserves, and many of those with high cash reserves have little or no debt. These facts qualify favorable interpretations of the over-all financial picture.

Balance Sheet Improvement

Cash receipts from farm marketings in 1945 were somewhat above 1944 levels, in most States, although some decreases were in evidence, particularly in the cotton South. Income from crops was about the same as in 1944. Receipts from livestock and livestock products were 4.7 percent greater and mostly accounted for the 2.7 percent national average increase in receipts farm marketings.

Production costs appeared to be on the increase, though restrained by price controls on goods purchased by farmers. Notwithstanding higher costs and a slightly reduced physical output, the 4-percent increase in prices paid to farmers was sufficient to raise net income from agriculture to 16,060 million dollars, or 5 percent more than in 1944. Government payments were somewhat smaller in 1945 than the year before. With Government payments included, the total net income from agriculture was 16,831 million dollars.

Evaluation of the Balance Sheet

One factor in the interpretation of the balance sheet deserves notice here. The increase in the valuation of physical assets, which in magnitude overshadows all other changes, is due mostly to increases in prices, which at the beginning of 1945 were already high. This development improved the financial condition of many farmers, but could obviously increase financial obstacles to farming and also *risks* of ownership, particularly for recent purchasers. Not so serious for those who pay cash, the risks when farms bought at high prices are mortgaged become considerable.

Prospects are against an immediate shrinkage in farmer-owned liquid assets; but a decline may take place when manufactured goods once more become abundant. Such a decline would probably appear first in currency and deposit holdings; Government bonds would generally be cashed only after money balances had been drawn down. Where income and accumulated money are insufficient to meet requirements, borrowing may be resorted to even before bonds are cashed.

The above-mentioned concentration of deposit and bond holdings indicates wide disparity in individual farm incomes, even in years of prosperity. What does it suggest concerning the probable use of the 15 billion dollars held by farmers in deposits and Government bonds? Probably a considerable part of the accumulation, especially the part in bonds, is likely to be undisturbed by expenditures for improvements and new equipment during the postwar period. In that event, any general desire to alter farm products or methods, to add new equipment to the farm and farm home, or to acquire farm real estate will require expansion of credit.

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THE PRICE-CONTROL CRISIS

The price-control legislation, under which the wartime price stabilization program operated, extended only to June 30, 1946. It was evident inflationary pressures would not subside by that time. Accordingly, the President early in 1946 requested the Congress to extend price-control legislation and also the authorization to pay subsidies for a full year beyond June 30. The Congress, however, was not willing to do so without substantial amendments. An amended bill was not agreed upon by the respective branches of the Congress until late June. A drastically revised price-control bill was then sent to the President, who returned it with a veto message which again urged the continuation of effective price-stabilization legislation for a full year.

The bill, said the veto message, continued the Government's responsibility to stabilize the economy but destroyed the Government's power to do so. The message objected especially to a provision which made it mandatory in establishing price ceilings for manufactured articles to allow the same profit per unit of sale which the industry had received for the particular product in 1941. Inflationary consequences would have resulted from such a requirement because 1941 was a year of abnormally high unit profits for most manufacturers and because in the year ahead output in most lines could be expected to exceed that of 1941.

After receiving the President's veto message the Congress took no further action by July 1. Consequently, on that date the country was without price-control legislation. The President asked all groups to keep prices in line pending clarification of the price-control issue.

The response was mixed. In general, prices of food products on which subsidies had formerly been paid moved upward. During the first 2 weeks of July the Bureau of Labor Statistics weekly index of wholesale prices advanced 7 percent. Food rose 18 percent and farm products 10 percent. The index of prices paid by farmers, including interest and taxes, advanced to 199 on July 15—11 points over a month earlier. The index of prices received by farmers advanced 12 percent from 218 on June 15 (1909–14 = 100) to 244 on July 15. In July this index was 9 points higher than the previous record established in May 1920. Prices received by farmers average 123 percent of parity, equal to the previous all-time high established in April 1943.

The Revised Price Control Act

Action proceeded in Congress with a revised bill and on July 25 the Congress passed and the President approved the Price Control Extension Act of 1946. The President indicated that though the measure provided no absolute assurance that inflation could be avoided, it offered a sufficient prospect of success to warrant wholehearted effort. Price ceilings were restored under the amended Price Control Act at June 30 levels, except in the case of certain exempt items.

Poultry and eggs, and any food or feed products made in whole or substantial part therefrom, and leaf tobacco and tobacco products were exempted from price control except that after August 20 controls could be reestablished if prices rose unreasonably and if certain other conditions were fulfilled.

The following commodities were exempted from price control until August 21: Livestock, milk, cottonseed, soybeans, and food or feed products processed in whole or substantial part from these commodities; corn, wheat, rye, oats, barley, grain, sorghums, and flaxseed, including any livestock or poultry feed made in whole or substantial part therefrom. The act provided that ceilings were to be automatically restored August 21 on this group of commodities unless the Price Decontrol Board created by the act directed otherwise.

This board was directed to hold public hearings with respect to the desirability of reestablishing price ceilings on the above list of commodities and to prohibit their reestablishment unless it found:

1. That the price of the commodity had risen unreasonably above a price equal to the lawful maximum price in effect on June 30, 1946, plus the amount per unit of any subsidy payable with respect thereto as of June 29, 1946.

2. That such commodity was in short supply and that its regulation was practicable and enforceable and

3. That the public interest would be served by such regulation.

Other highlights of the new price act were as follows:

1. The Secretary of Agriculture was required on September 1 to submit to the Price Administrator a list of agricultural commodities in short supply. Modifications were to be made in the list on the first of each succeeding month thereafter. Any commodity not so listed was automatically decontrolled. The definition of an agricultural commodity was broadened under the new act to include any food or feed product processed from an agricultural commodity.

2. The Secretary was empowered to recommend to the Price Administrator any increase in maximum price for an agricultural commodity which in his judgment was necessary in the interests of production. The Price Administrator was required to act favorably on any such recommendation within 10 days.

3. By December 31 the Secretary was required to recommend the removal of price ceilings from all agricultural commodities not important in business or living costs. These recommendations likewise had to be put into effect by the Price Administrator within 10 days.

4. The Secretary of Agriculture was authorized to withdraw his approval of any price regulation at any time, and in exercising his responsibilities under the act, the act provided that he should not be subject to the direction or control of any other appointive officer or agency of the Government.

5. The act authorized the use of 1 billion dollars for subsidy purposes including both agricultural and nonagricultural commodities. This was about half the amount spent the previous year. Major limitations applicable to agricultural commodities were as follows:

1. No subsidies could be paid on commodities not under price control.

2. Subsidy rates with respect to a commodity could not exceed those in effect on June 29, 1946, and subsidy operations were limited to those programs in effect on that date.

3. All subsidy operations were required to be terminated not later than April 1, 1947.

4. The Price Decontrol Board was given authority to determine whether or not subsidy operations should be resumed on commodities under its jurisdiction.

Price Movements After Control Reinstatement

The reinstatement of price control did not immediately halt the upward movement in commodity prices. Many foods continued free of price control, and the OPA proceeded immediately to grant a number of price increases required under the provisions of the act. Among the commodities affected were automobiles, certain other durable consumers goods, and textiles.

As a result, the Bureau of Labor Statistics index of wholesale prices, which had risen 7 percent by mid-July, advanced by mid-August to nearly 14 percent over late June. Prices received by farmers and also prices paid by farmers both registered further increases of 5 points on August 15. The index of prices received advanced to 249 percent of the 1909–14 average and that of prices paid, including interest and taxes, advanced to 204.

Action by Decontrol Board

On August 21 the Price Decontrol Board ordered ceilings replaced on livestock, soybeans, cottonseed, and flaxseed products, and by-product grain feed. The Board also ordered the reestablishment of meat subsidies that were in effect on June 30. At the same time it ordered continued freedom from control for dairy products and most grains.

Livestock and meats, the Board found, had risen unreasonably. An extreme top of $30.25 a hundredweight for steers was registered on the Chicago market, as compared with the previous overriding ceiling of $18. Top prices for hogs at Chicago reached $24.50 a hundredweight compared with the previous ceiling of $14.85. In order to obtain necessary production the Secretary directed that in reestablishing price ceilings on cattle and hogs, the former ceilings be increased to $16.25 a hundredweight for hogs and the overriding ceiling for cattle increased to $20.25 a hundredweight, Chicago basis. These ceilings went into effect on September 1.

Regarding grains and dairy products, price movements during the interim period largely influenced the Decontrol Board's decision. Although wheat prices rose sharply above June 30 ceilings during the first few weeks of July, price trends were again downward when the Board made its findings. At this time No. 2 hard winter wheat was being quoted at about $2 a bushel on the Kansas City market, or barely above the increased parity price. With respect to dairy products, the Board on August 21 failed to find prices had risen unreasonably above former ceilings plus subsidies. But on September 12, following a rise in the prices of butter and cheese, the Board issued a formal call for an explanation of the increases. It said the advances endangered the general price level of all dairy products.

First "Short Supply" List Certified

The first list of agricultural commodities in short supply was certified to the Price Administrator on September 1 in accordance with the provisions of the Price Control Act. The decontrol of all fresh vegetables and fresh fruits except fresh oranges was completed as a

result of their omission from this list. Other commodities which the Secretary found not to be in short supply included certain canned fruits and vegetables, hay, wool, edible tree nuts, and broomcorn.[2]

LAND MARKET CONTINUES ACTIVE

Land values and the volume of sales during the past year were both higher than a year ago. For the fifth consecutive year, values advanced at an average rate of about 1 percent a month. The volume of sales was up from the previous year and but slightly under the record high reached 2 years ago. Resales of farms after a limited period of ownership increased in volume. As in the preceding year, more than one-half of the sales were entirely for cash, and down-payments averaged somewhat over two-fifths of the purchase price.

The land-values index rose 13 percent during the 12 months ended March 1, 1946. The increase brought average values to a level 71 percent above that in the 1935–39 period, an advance about equalling the 70-percent rise of the 1912–14 to 1920 period. In only 2 of the last 35 years has an annual increase greater than 13 percent been reported. Values rose 15 percent during the year ended March 1944 and 21 percent in 1919–20, when the peak of the World War I land boom was reached.

Land values continued to advance into the summer of 1946. Values rose an additional 4 percent from March to July, carrying the index to a level 77 percent above that of 1935–39 and 47 percent above that of 1912–14. During the past year the greatest increases occurred in the South Central, South Atlantic, and East North Central groups of States. Except for a moderate rise in New England, substantial increases occurred in each of the other geographic areas.

Land values are now more than double their 1935–39 average in the East South Central States, and almost double in the East North Central, South Atlantic, Mountain, and Pacific States. Values are up about two-thirds in the West South Central, three-fifths in the West North Central, and one-third in the New England States. Much larger increases have occurred in a number of individual States and in areas within States.

Average values in North Carolina, Kentucky, Tennessee, and Colorado on July 1, 1946, were two and one-fifth times their 1935–39 averages. Average values had more than doubled in 7 other States, and had increased by four-fifths or more in 10 other States. Increases were more limited throughout the New England States, with advances ranging from 29 percent in Massachusetts to 43 percent in Vermont. Average values in one-third of the States had exceeded the levels of 1920. In the Pacific States the average was almost one-third above the 1920 level; in the East South Central States about one-tenth higher; in the New England States approximately the same as in 1920.

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[2] On October 15, 1946, the Secretary of Agriculture approved an order submitted by the Price Administrator which removed price ceilings from all livestock and all food or feed products processed or manufactured in whole or in part from livestock. This decontrol action followed conferences with the President. The statement which announced it said liberal marketings of cattle for slaughter were necessary to prevent over-grazing, and yet could not happen while there was considerable agitation for the removal of price ceilings.

The volume of sales in the 12-month period ended March 15, 1946, was 7 percent above the previous year and within 2 percent of the record high. The estimated number of voluntary sales and trades averaged almost 55 per 1,000 of all farms. This was more than 10 percent higher than in 1919 and not far from double the 1935–39 average. Sales increased in volume generally throughout the country. All geographic divisions except one reported a rise. Sales decreased slightly in the Pacific States, though the level there remained above that of all other geographic divisions.

For the country as a whole, nonfarmers bought over one-third of the farms transferred, a proportion about the same as that of the previous year. In the New England States nonfarm operators bought three-fifths of all tracts sold; in the Middle Atlantic States one-half. In the Mountain and West North Central States, on the other hand, only one-fourth of all sales were to nonfarmers. Sales by owner operators again increased in relative importance, accounting for about one-half of all sales. Approximately one-tenth of the farmers who sold farms expected to enter other occupations, one-fifth expected to retire, and the others intended to continue farming—either on reduced holdings or on some other farm. Sales by corporate agencies continued to fall.

The resale of property held for a limited ownership period has increased slightly. One-tenth of all sales were resales of property held less than 2 years in the first half of 1944; one-eighth in the latter half of 1944. Through 1945 and the first quarter of 1946, the ratio was constant at one-seventh. Resales after less than 2 years of ownership varied from 6 percent of all sales in the West South Central States to 22 percent in the Western States.

As in other recent years, cash sales were a rising proportion of all sales. Individuals and commercial banks continued to increase in relative importance as sources of credit to finance purchases. The proportion of loans made by insurance companies and by the Federal loan agencies decreased. Purchases financed by loans by individuals were almost one-half of all credit-financed purchases in 1945. Commercial banks financed about one-fourth; insurance companies and the Federal land banks each financed one-tenth. Down payments continued to run just above two-fifths of the purchase price.

The high proportion of cash sales and the substantial down payments will limit the amount of distress involved should current valuations prove to be above the earning capacity of farm properties. Purchases made with small down payments and with heavy mortgage debts foreshadow possible trouble. On a significantly large number of farms, debts being incurred to finance purchases would exceed the full market value of the farms a few years ago. About one-third of all current farm purchases involve a debt of 50 percent or more; one-seventh have an initial encumbrance of at least 75 percent of the purchase price.

High farm production and farm income, coupled with a large accumulation of liquid funds, were the principal stimulating factors in the increase of values and transfers. Easy credit conditions encouraged some purchases and could make possible an increasing volume of mortgage-financed transfers. On the other hand, some signs developed of increasing caution on the part of prospective farm buyers.

Individual farmers, farm organizations, agricultural college groups, and Government officials appear inclined to question the soundness of current value levels. This Department sponsored various educational and voluntary measures to dampen inflationary influences. Other educational and research agencies, as well as various business groups and concerns, did the same.

Future developments will depend largely on changes in farm incomes and in the income and investment opportunities of nonfarm investors. Needless to say, farm prices and the demand for farm products will depend in turn on the prosperity of the economy. Despite a generally favorable outlook, average land values in a number of areas may already be beyond levels likely to be justified by long-term farm earnings.

Purchasers with heavy indebtedness will be hard-pressed if agricultural incomes decline. Some of them may have to incorporate operating and production credit obligations into real estate indebtedness. This will further increase their long-term commitments. Suitable programs might ease the distress likely to ensue. Foreclosures, assignment, and bankruptcy are costly adjustments in the process of reconciling farm real-estate values and lower incomes. Other methods have been used in such circumstances and might be used again, such as, voluntary farm-debt-adjustment procedures, conversion of loans to some type of variable-payment plan, restrictions on the use of deficiency judgments, equitable and effective debt moratoria, and public measures to encourage and enable private and public loan agencies to service the credit needs of agriculture during distress periods.

FARM-MORTGAGE AND OTHER FARM CREDIT

Demand for both long-term farm-mortgage credit and production credit through the Farm Credit Administration showed a substantial increase in the year ended June 30, 1946, but the volume of funds going to finance the operations of farmers' cooperatives declined.

Farm-mortgage loans by the Federal land banks and the Land Bank Commissioner increased both in number and volume. The number of applications closed as loans for the fiscal year 1945–46 was 29,700, as compared with 27,016 the previous year, and the amount totaled $134,781,673 as compared with $120,356,081. About 41 percent of the amount requested was for the purchase of land, an increase of about 20 percent over that of the previous year.

Despite increasing land values, which to July 1, 1946, had gone up 77 percent from the 1935–39 average, the land banks are continuing to use normal agricultural value as their yardstick in determining the size of loan that can be safely carried on a farm.

In keeping with the trend in farm-mortgage debt, which has been downward for several years and is now the lowest since 1915, farmer borrowers continued to make large repayments on the principal of their loans. Land bank and Commissioner loan repayments on principal plus loans paid in full totaled $297,839,349, which was approximately 14 percent less than the previous year's total of $345,932,549. On July 1, 1946, the banks held $21,523,526 in future payment funds to be used to pay future installments on land bank and Commissioner

loans. Interest is paid on these funds at the same rate the borrower pays on his loan.

In February 1945 the Federal land banks made their first public offering of consolidated bonds since 1936. Since then, and to July 1, 1946, there have been three issues.

Production Credit

Credit service of the 506 production-credit associations reached a peak volume of $560,952,188 in 222,336 loans closed—a considerable increase over the $500,305,170 lent in 214,883 loans during the previous year. This larger amount of production credit needed by farmers is due largely to increased prices of the items that go into farm production, to the larger acreages operated, and to the wider use of power machinery.

Membership in the production-credit associations on June 30, 1946, was over 390,000. Many of these members, as indicated by the number of loans closed, did not need the services of the associations during the year because of very favorable farm-income situations. By retaining their membership, however, and keeping their association stock, they are assisting in capitalizing their own credit system and are in a position to borrow when they may need credit.

The 12 Federal intermediate credit banks during the fiscal year ended June 30, 1946, extended credit amounting to $909,298,726. Of the total of $347,856,705 in loans and discounts outstanding on June 30, 1946, production-credit-association paper accounted for 85.4 percent; paper carried for privately capitalized financing institutions, 9.6 percent; loans to and discounts for banks for cooperatives, 4.6 percent; and the remaining 0.4 percent was direct loans to cooperative associations.

The 13 banks for cooperatives served the needs of farmers' cooperatives with credit totaling $375,539,727 for the year. This compares with $407,470,242 in the 1944–45 fiscal year. While the loan volume was less for year ended June 30, 1946, most of this decline resulted from fewer loans to finance commodities in storage. Also, part of the decreased volume may be attributed to the fact that cooperatives, like their farmer members, have been able to strengthen their financial positions during the high farm-income period. Also, the scarcity of materials and equipment has delayed erection of buildings and additions to plants calling for the use of borrowed funds. The banks continued to serve about the same number of cooperatives—1,251 on June 30, 1946.

Emergency Crop and Feed Loans

Emergency crop and feed loans, made to farmers unable to qualify for loans at reasonable rates of interest from other sources, during the year totaled 80,381 and amounted to $17,543,430, which was the smallest number of such loans made in any year since the organization of the Farm Credit Administration in 1933. This decreased volume may be attributed to improved farm conditions with most farmers qualifying for credit from production-credit associations and other sources of short-term lending.

THE FARMERS HOME ADMINISTRATION

On the first of November, Farm Security Administration's functions and those of the Emergency Crop and Feed Loan Division of the Farm Credit Administration were merged into a new agency: the Farmers Home Administration. This was done under the terms of the Farmers Home Administration Act of 1946 which was approved by the President on August 14, 1946.

The act amends the Bankhead-Jones Act of 1937, provides basic legislative authority for production and subsistence loans which are similar to Farm Security Administration's rural rehabilitation loans, and broadens the scope of the farm ownership loans.

Types of credit available through the Farmers Home Administration are:

1. Farm ownership loans up to the reasonable value of the farm and necessary improvements to buy, repair, improve or enlarge family-type farms. The loans are repayable in 40 years, at 3½ percent interest. No loan can be made if the value of the farm as acquired, improved, or enlarged is greater than the average value of efficient family-type farms in the county.

This type of loan may be made either directly by the agency or by private lenders. When private lenders extend the credit, the Farmers Home Administration will insure the mortgages, and the loans will be limited to 90 percent of the reasonable value of the farm and necessary improvements. The mortgage-insurance features of the Farmers Home Administration Act are not yet in operation, as the funds for the insurance have not been appropriated. Direct loans are, however, being made by the Farm Home Administration.

2. Production and subsistence loans up to $3,500 for buying livestock, seed, feed, fertilizer, farm equipment and other farm needs, for refinancing indebtedness, and for family subsistence. This operating credit is repayable in not more than 5 years, at 5 percent interest.

Supervisory services are provided with each loan. A special condition under which all loans are made requires that if at any time it appears to the Secretary of Agriculture that the borrower may be able to get a similar loan from a cooperative or private credit source, under terms prevailing in the area, and at an interest rate not exceeding 5 percent, he must apply for such a loan. If his application is approved, he must accept the loan from the other credit source and pay off his debt to the Farmers Home Administration.

Special benefits for veterans are provided. Veterans who served in the armed forces of the United States during any war with another nation have preference for direct and insured farm ownership loans. Disabled veterans are eligible to buy, repair or improve farms adapted to their capacities, even if the farms are smaller than family-type, provided the veteran's farm income plus his pension will be enough to pay living and operating expenses and retire the debt.

OPERATIONS OF COMMODITY CREDIT CORPORATION

Subsidy programs and the procurement of agricultural commodities for shipment abroad continued as the principal activities of the Commodity Credit Corporation during the fiscal year 1946.

Although several subsidy programs were discontinued during the year, subsidy costs were larger than in any previous fiscal year. Purchases under the General Commodities Purchase Program declined considerably, reflecting the gradual liquidation of this program. The volume of loans made to farmers was much smaller than in the preceding year. By Executive Order the procurement of foreign commodities was transferred back to the Corporation from the U. S. Commercial Company during the year. Purchasing of commodities to fulfill price-support mandates was necessary in only a few commodities.

Total purchases made by the Commodity Credit Corporation during the fiscal year 1946 amounted to 2.1 billion dollars. Sales during this period amounted to 3 billion dollars. These figures compare with purchasing of 2.6 million and sales 3.1 billion dollars in the 1945 fiscal year. Collateral acquired from producers in satisfaction of loans amounted to 64 million dollars in the fiscal year 1946, compared with 205 million in the preceding fiscal year. Before valuation reserves are taken into account, the book value of commodities owned by the Corporation on June 30, 1946 was 651 million dollars. This amount is 541 million dollars less than the comparable book value of inventory held on June 30, 1945.

During the past fiscal year the net loss of the Corporation was 830.4 million dollars or 4.4 million dollars less than during the prior 12-month period. The total cost of subsidy programs was 845 million dollars, an increase of 102 million over the previous year. The principal offset to losses incurred during the year was a profit of 91.5 million dollars on sales of cotton. Not included in the subsidy losses mentioned above is a loss of 32 million dollars representing the cost of the export differential absorbed by the Commodity Credit Corporation under the cotton and wheat export program.

Subsidy Operations

Despite the discontinuance of several subsidy programs during the year, expenditures and accrued obligations for the fiscal year 1946 exceeded those for the preceding year by 102 million dollars. In all, the total subsidy cost in fiscal year 1946 amounted to 845 million dollars, as compared with 743 million dollars in fiscal year 1945. Subsidies on milk and its products totaled 544 million; on meat animals, 75 million; on fruits and vegetables for processing, 103 million; on sugar, 70 million; on oilseeds and products, 46 million; and on other programs, 7 million. The subsidies on peanut butter, shortening, and Cheddar cheese were discontinued on November 1, 1945, January 1, 1946, and February 1, 1946, respectively. With the sole exception of sugar, all other subsidy programs were terminated as of June 30, 1946, or on July 28, 1946, under the terms of the Price Control Extension Act of 1946.

General Commodities Purchase Program

During the war the largest part of the Corporation's activity consisted of the procurement and pooling of large quantities of agricultural supplies and products to meet the collective needs of lend-lease, the armed forces and Red Cross, UNRRA, and other agencies. The purchases made under this operation, known as the General Com-

modities Purchase Program, also served to implement the price-support commitments made when farmers were encouraged to greatly expand their production of agricultural commodities. With the termination of lend-lease, deliveries rapidly declined, but at the same time there was an increase in cash sales to foreign governments and to UNRRA. Purchases under the General Commodities Purchase Program amounted to 757 million dollars in the fiscal year 1946, compared with 1,185 million during the fiscal year 1945. Sales totaled 964 million dollars in the fiscal year 1946, compared with 1,723 million dollars during the previous year. The inventory of commodities owned under this program decreased 109 million dollars during the year, and totaled 161 million dollars on June 30, 1946. The principal commodities in inventory on June 30, 1946, and their cost value were dairy and poultry products, 50 million dollars; grain products, 35 million dollars; livestock products, 49 million dollars; and fruits and vegetables, 5 million dollars. The program was placed in liquidation on that date and a final accounting for all transactions will be completed as soon as possible.

A new program, called the General Supply Program began operation on July 1, 1946. This program will be similar to the GCP program in that it will serve claimants such as foreign governments, UNRRA, relief and other agencies. Commodities will be purchased principally on the basis of firm requisitions accompanied by a cash advance from the requisitioning agency. Purchasing to meet anticipated requirements will be limited to specific instances where advance approval has been obtained. As of June 30, 1946, the Corporation had received a considerable number of requisitions for commodities from foreign governments which were as yet unfilled. Cash advances received from foreign governments to June 30, 1946, amounted to almost 518 million dollars. Invoices for goods delivered in the amount of 239 million had been recorded as of June 30, leaving a balance of unfilled requisitions, after refunds, of 276 million dollars.

Wheat and wheat flour represented the largest single item ordered by foreign governments, and on a dollar basis made up 30 percent of the total. The next largest item, amounting to 18 percent of the total, was dried and frozen eggs. Condensed and powdered milk, cheese, meats, fish, lard, and sugar made up most of the remainder. The largest advances were received from Great Britain, and in total, amounted to 226 million dollars, or 43 percent. Other large requisitions were received from France, 31 percent of the total; Belgium 12 percent; and India, 6 percent.

Inventories—Basic and Other Commodities

Before deducting valuation reserves, the book value of inventories owned by the Corporation on June 30, 1946, was over 651 million dollars. Of this amount 161 million dollars represented the value of commodities purchased for claimants under the General Commodities Purchase Program. The book value of basic and other commodities owned on June 30, 1946 was thus 490 million dollars. This compares with a figure of 922 million dollars on June 30, 1945, and reflects a reduction of 47 percent during the fiscal year 1946.

The largest decrease in inventory of a single commodity during the year was in the stocks of cotton held by the Corporation. On

June 30, 1945, the inventory was 5 million bales, valued at 447.5 million dollars. A year later, the inventory totaled 1.3 million bales with a book value of 140.9 million dollars. This large decrease in cotton inventory was accomplished despite acquisitions of 1.4 million bales during the year, since total sales amounted to 5.1 million bales. About two-fifths of the cotton was sold under the domestic-sales program and the remainder was sold for shipment abroad under the various export programs. The inventory of wheat owned by the Corporation also showed a large decrease during the year. Acquisitions of wheat, principally for emergency relief feeding and foreign governments, amounted to 318 million bushels during the year. As sales during the same period totaled 393 million bushels, the inventory of wheat declined to 29 million bushels with a book value of 53 million dollars. Substantial decreases were also shown in other inventory categories during the 1946 fiscal year. Tobacco stocks decreased 30 million dollars, oilseeds and products 28 million dollars and fats and oils 24 million dollars.

The only commodity owned by the Corporation which showed substantial increase in inventory during the 12 months ending June 30, 1946, was wool. This inventory increased by 159 million pounds, or about 84 million dollars. On a dollar basis, half of this increase was accounted for by purchases of wool from the 1946 clip. Purchases of 1945 clip wool amounted to 144 million dollars, making total purchases of 192 million dollars (320 million pounds of wool) during the year. About 160 million pounds of wool were sold during the year for slightly over 98 million dollars. Three-fourths of the wool sold was from the 1945 clip, and most of the remainder from older stocks owned by the Corporation. Losses on wool sold during the year were approximately 14 million dollars.

Foreign Purchase Program

The Commodity Credit Corporation began buying commodities abroad early in 1942, when it was designated by the Board of Economic Warfare as the sole agency for the purchase of agricultural commodities in foreign countries. On October 6, 1943, this function, with the exception of the purchases of sugar in Cuba and imports from Canada, was transferred to the U. S. Commercial Company which was then administered by the FEA. The Commodity Credit Corporation, however, continued to distribute foreign fats and oils under allocations, by purchasing the commodities from the U. S. Commercial Company after they arrived in the United States. The responsibility for procurement abroad of agricultural commodities in short supply was transferred back to the Commodity Credit Corporation on September 27, 1945.

Loans

Loans outstanding on June 30, 1946, totaled 48 million dollars, compared with 308 million on June 30, 1945, and 436 million a year earlier. Loans made during the fiscal year 1946 totaled only 170 million dollars, as compared with 527 million in the fiscal year 1945 and 528 million during the 1944 fiscal year. The extremely low volume of loan operations during the 1946 fiscal year reflects the large consumer de-

mand for farm products and the fact that market prices are in general in excess of loan rates. Of the total loans made during the fiscal year 1946, wheat loans amounted to 66 million dollars on approximately 50 million bushels and potato loans amounted to 44 million dollars on 40 million hundredweight. Loans were also made on 153,713 tons of peanuts with a loan value of over 25 million dollars, and on 216,084 bales of cotton with a total loan value of slightly over 22 million dollars.

Reserve for Postwar Support of Agriculture

The Congress, by an act approved February 18, 1946, appropriated 500 million dollars as a reserve for expenditure for the postwar price support of agriculture. It was directed that this sum should be paid to Commodity Credit Corporation and continued as a reserve fund to be expended as and when necessary. Accordingly, the Corporation now maintains a cash reserve fund of this amount for use when postwar price support operations become necessary. In this connection, the Congress has directed the Secretary of Agriculture to support the price of basic and certain nonbasic commodities at 90 percent of the parity or comparable price for period of 2 years after the legal termination of the war.

CROP INSURANCE

Federal crop insurance protection is available nationally to producers of wheat, cotton, and flax. In 1946 there is insurance on over one-half million farms in more than 1,900 counties. In about 375 of these counties farmers have insurance on 2 or more commodities.

Wheat crop insurance contracts are in force in 1946 covering approximately 385,000 wheat farms located in over 1,400 counties in 35 States. Since wheat is insured under 3-year contracts, most of these 385,000 wheat farms will be covered by insurance in 1947 and 1948. In addition, new applications are now being received by the Federal Crop Insurance Corporation for insurance on the 1947, 1948, and 1949 wheat crops.

Cotton crop insurance contracts are in force in 1946 covering approximately 137 thousand cotton farms located in nearly 700 counties in 18 States. These contracts will continue in force from year to year, subject to an annual cancellation clause which may be used by either the farmer or the Corporation.

Flax crop insurance contracts are in force covering about 14 thousand farms located in 175 counties in 12 States. These insurance contracts are on an annual basis.

Plan of Insurance and Protection Offered

Crop insurance is against loss of yield—not price. The farmer's price risks are cushioned on many commodities through commodity loans and other price-supporting programs of the Department of Agriculture. The insurance protection is against essentially all unavoidable production hazards, including drought, flood, winter-kill, insect infestation, plant disease, etc.

The amount of insurance is optional at either 75 percent or 50 percent of the long-time average yield for the farm. However, the full 75-percent and 50-percent figures apply only to harvested acreage. The amount of insurance protection is lower in the early growing season; it increases as the crop progresses. The amount of insurance, the premium, and the indemnity are in commodity units such as bushels of wheat or pounds of cotton, but payment of premiums and indemnities is usually made in the cash equivalent at the current price.

Loss Experience

On the basis of the prospective crop yields, it appears at the time of this writing that the 1946 loss experience on wheat and flax will be favorable. It further appears that this experience on cotton will be unfavorable, owing primarily to the poor condition of the crop in Texas, Oklahoma, Louisiana, and Mississippi.

The 1945 loss experience was favorable on both wheat and flax. As of June 30, 1946, the wheat indemnities amounted to only 43 percent of the wheat premiums and the flax indemnities to only 58 percent of the flax premiums. However, the cotton indemnities amounted to 335 percent of the cotton premiums. This unfavorable cotton loss experience was due primarily to severe drought in the western third of the Cotton Belt and to excessive rain accompanied by floods and boll weevil damage in most of the eastern two-thirds of the Cotton Belt.

Trial Insurance

Insurance is also being tried on corn and tobacco in 19 representative counties each. About 8,500 corn farms and 14,000 tobacco farms are insured in these counties; 1946 is the second year of this trial insurance. The purpose of the experimental program is to determine the most practical plan, terms, and conditions of insurance on these commodities. This purpose might not be accomplished if only one plan of insurance were offered; consequently, two plans of insurance are being tried on each commodity. One plan is insurance against loss of investment with the amount of insurance not exceeding 75 percent of the investment in the crop. Under this plan the amount of insurance is stated in dollars instead of bushels or pounds. If the returns from the crop in the year of insurance are less than the guaranteed amount, the insured farmer is indemnified.

The second plan for tobacco is also stated in dollars and is known as the yield-quality plan. Under this plan, the dollar amount of insurance is determined at the end of the season; it is based on 75 percent of the long-time average yield for the farm and a representative price for tobacco in the year of insurance, as adjusted upward or downward for individual farmers to reflect their past experience in selling at prices above or below the market average. The second plan for corn is against loss of yield, as in wheat, cotton, and flax.

As of June 30, 1946, the tobacco losses for 1945 amounted to 69 percent of the premiums and the corn losses amounted to 156 percent of the premiums. The loss experience thus far does not reflect the feasibility of insurance on these crops; it reflects principally the variation in the 1945 crop conditions in the trial counties. The Corporation is using this program also to test variations from methods

used in the insurance of wheat, cotton, and flax. The results obtained from these small tests will be useful in gaging insurance on all commodities.

Changes in Program

There was no prior successful experience with all-risk crop insurance which the Corporation could use in initiating the Federal crop insurance program. Consequently, it had to blaze the trail in developing this kind of insurance and in establishing an actuarial basis. Federal crop insurance is still relatively new and even though major changes have already been made, based on experience gained, other changes are being made currently. One of these changes is in the cotton program being developed for 1947. This change has a twofold purpose: One is the establishment of progressive amounts of insurance which in the early part of the growing season will more nearly approximate the investment in the crop; the other is to have a more understandable program from the farmer's point of view.

SCHOOL LUNCH PROGRAM

The National School Lunch Act, approved June 4, 1946, establishes a permanent basis for a program which the Department has administered since August 1935. Participation in the school-lunch program during the school year 1946–47 will probably include some 8.6 million children in 48,000 schools. School lunches in the 1945–46 school year benefited 7 million children in 44,000 schools.

The new act authorizes appropriations to the Department of Agriculture to assist States in "the establishment, maintenance, operation, and expansion of nonprofit school lunch programs." The money will be given as grants-in-aid to States to reimburse schools for food and equipment purchases.

Funds authorized for equipment are limited to $10,000,000 annually; funds for school-lunch food, however, will vary from year to year with requirements. Apportionment among the States will be in line with numbers of school children between 5 to 17 and with per capita State incomes.

Federal funds if accepted must be matched, dollar for dollar, by State funds until 1951. Thereafter, until 1955, the State contribution must be increased to $1.50 for every Federal dollar. After 1955 the State must provide three times the Federal contribution. In a State whose per capita income is less than the average for the United States, however, the matching required for a fiscal year may be decreased by the percentage of difference between the State's per capita income and that for the United States.

Assistance may be given to nonprofit private schools that meet eligibility requirements, as well as to public schools. In most cases, the Federal funds for both types of school will flow through State educational agencies. In States not legally authorized to disburse contributions to private schools, the State offices of the Production and Marketing Administration will handle the contracts.

Eligibility Requirements

The eligibility requirements are the same as those observed during the last 3 years. Schools that accept Federal assistance must serve

a lunch suited to the nutritional needs of growing children; reimbursement at the highest rate will be for the complete meal known as the "Type A." Lunches must be available to all children without discrimination, regardless of their ability to pay. Schools must keep records, so that compliance with the provisions of the act may be determined.

This legislation has a twofold declared purpose: (1) to safeguard the health and well-being of our Nation's children, and (2) to encourage the domestic consumption of nutritious agricultural commodities and other food. In this respect it follows the principle emphasized previously in the school-lunch programs. In prewar years, under Section 32 of Public Law 320, Seventy-fourth Congress, foods purchased by the Department to alleviate market conditions were distributed to State welfare agencies for use in school-lunch programs. During the war, when food surpluses almost disappeared, a reimbursement plan was widely used instead, whereby school-lunch operators received money to cover part of their food costs.

The new program will emphasize the use of the more abundant foods. Whenever market conditions are such that the Department must purchase quantities of certain foods, it will offer such foods to schools for the lunch program. It will assist schools in making an efficient use of the foods provided and in improving the school-lunch program as a whole.

RURAL HOUSING

It is important that the Nation have a sound housing policy and that all citizens understand the policy. Too often efforts to improve housing have been limited to urban housing. But need for improvement of rural housing is urgent. Any realistic program for better housing must recognize the needs of the farm as well as the nonfarm population. About two-thirds of the Nation's farm families are not adequately housed; one-third of our farm families live in houses so poor that they are virtually beyond repair. Farm people are entitled to a parity of living conditions, including housing, with nonfarm groups.

Provision for adequate rural housing would involve much new construction, remodeling, and repairs and consequently would contribute greatly to general business activity and full employment. Conversely, business activity and full employment will contribute to better housing, since it will provide purchasing power for large numbers of people. Programs of this Department have assisted farmers to obtain increased incomes and have thus enabled them to afford better housing. Some of the Department's programs have contributed more directly to improved housing.

For example, the Department has carried on a research program in farm housing and other farm construction; in cooperation with State Extension Services it has made building designs and plans available to farm people. Agencies of the Federal farm-credit system have provided loans for the construction or repair of houses on farms. Loans for this purpose may be made by Federal Land Banks up to 65 percent of the value of the land and buildings, and by the Land Bank

Commissioner under certain conditions up to 75 percent of the value of the farm. Also, the Farm Security Administration has made loans to farm tenants, farm laborers, and veterans under certain conditions up to 100 percent of the purchase value of a farm. This includes the cost of construction or repair of farmhouses and other farm buildings.

But these programs, good as far as they go, are not primarily rural housing programs. Farm housing differs from city or suburban housing in several important respects. The farmhouse is a part of a farm, and must be considered in relation to the land and other farm buildings. Even in design the requirements for a farmhouse differ from those of a city house. Money earmarked for building or maintaining the farmhouse, and the amount of debt that safely can be incurred for such a purpose, depend on the farm income. In the city the association between a house and a particular business or job is not so close. The city dweller may get a new job and continue to live in the same house; or he may move to a different house without changing his job. Thus, a city house usually has a value of its own, distinct from the source of income of the occupants. But the value of a farmhouse is a part of the value of the whole farm, and efforts to improve farm housing must often embrace efforts to improve the farm as a whole.

To improve housing on full-time farms and on part-time farms that provide a substantial portion of a family's income calls for different approaches under different conditions. Many farmers have the cash or credit to repair, remodel, or build new houses and other needed farm buildings. Possibly 3 million families are in this group. These farmers have no problem of financing, but they have the problem of getting suitable designs for farmhouses and other farm buildings and of getting the construction done efficiently and at a reasonable cost. Other farmers do not have the cash or credit necessary to improve their housing and farm buildings. But they have adequate farms; they have an adequate source of income to warrant a construction or repair program. Such farmers should be in a position to obtain suitable construction loans. An estimated 1 million farmers are in this group. Still other farmers have neither the cash nor the basis for credit; they live on farms that are not adequate but could be made adequate to support improved housing. Farmers in this category need a combination program for home improvement and farm improvement. Specifically, they need assistance over and above long-term low-interest credit and other direct housing aid.

Types of Housing Assistance

Loans and other types of assistance, such as existing programs of the Department of Agriculture provide in many ways, could help to convert many inadequate farms into adequate farms. But the authority is limited. Multipurpose programs would help to improve or enlarge such farms, to facilitate changes in types of farming and in farm practices, and consequently to include better housing in the total list of farm objectives. Loans for the improvement or enlargement of uneconomic units, along with loans for the construction or repair of houses and other farm buildings, would apply the principle

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I have mentioned—namely, that the farm and the farm home make an operating unit.

But there are farmers who have neither cash nor credit and no prospect of obtaining an adequate farm unit which would support good housing. Making adequate housing available to this group presents a tough problem, actually a part of the employment program. It would not be a true solution to provide dwellings more costly than the family earnings could support. Full employment will provide opportunities for many farm families to obtain more productive jobs off the farm. Without full employment their difficulties will continue and will require action beyond the scope of any housing problem pure and simple. But special loans and grants might be desirable for temporary improvements such as roof repairs, sanitary water supplies, and so forth. Failure to make such improvements may threaten the public health.

As a whole, the rural housing problem is urgent and offers a real challenge. Every citizen, both in urban and rural areas, should be well housed. This may be a distant goal, but we should move toward it as rapidly as possible. I believe the Government should assist private enterprise in accomplishing as much of this job as necessary. Beyond that, I believe that Government should render whatever additional assistance is necessary to assure that substandard housing in a Nation as great as ours will no longer be tolerated.

INDUSTRIES FOR RURAL AREAS

Growth of local industries offers advantages to many rural communities. These advantages include increased employment, better incomes, and higher levels of living. Urban and rural people may share the benefits, which take form in expanded markets for both industrial and agricultural products. Particularly important to rural people is the chance such growth provides for farm youth not needed on the farm to get nearby nonfarm jobs.

Necessarily, the industrial opportunity varies greatly among States and regions, in line with comparative advantages; some regional specialization develops naturally in industry, just as it does in farming. Frequently, however, opportunities for local industrial growth remain undeveloped, with bad effects on the local economic balance. It is a general rule that States and regions that have very little industry to complement their agriculture have comparatively low average per capita incomes. As the degree of industrialization rises, the income level rises also.

This Department recently compared income figures for 12 scattered, random-selected rural counties of relatively high industrialization with the corresponding figures for neighboring predominantly agricultural counties. In the most industrialized counties the trade and income figures for 1939 indicated that the per capita income averaged $304. The corresponding figure for the farming counties was only $187. Annual retail sales averaged $312 in the industrialized counties and $233 in the farming counties. Farm home values, a good index of farm prosperity, averaged $1,511 in the industrialized and $1,231 in the predominantly farming counties.

Greater Rural Industrialization Feasible

Where greater rural industrialization is feasible, agricultural people have an interest in promoting it. Many farms are too small or too unproductive to give all their occupants a good living; in other words, some of the people living on these farms are not fully employed. If some of them could get work in nearby industries, the local underemployment on farms would decline. Also, the problem of increasing farms that are inadequate would be less difficult. As the men who could be spared from farming moved away, farms could be consolidated or otherwise enlarged. This would harmonize with the trend. The average size of farms in the United States, which between 1930 and 1945 increased from 157 to 191 acres, will probably continue to increase. But if that is to happen without causing distress to some people, more nonfarm jobs must be available. It is a great advantage when such jobs can be had not too far away.

In the years just before World War II the farms of the South, for example, had about 4 million men and women working on them. This number was probably excessive even then; undoubtedly, it is much more so now. Wide adoption of machinery and of other technical improvements has reduced the farm man-power requirement and pointed to the probability of a further reduction. It has been estimated that within a decade or so the mechanical cotton picker, the flame cultivator, and other recently developed machines may enable the South to do its farming with 3 million workers. This change, if it takes place, will require an offset in the form of increased nonfarm employment.

Widespread Opportunity Needs Development

But the South is by no means the only region that will have more manpower on farms than farming requires. Farm population, as is well known, grows rapidly, and under conditions of rapid improvement in farm technology must constantly be drawn off to some extent into industrial employment. In the United States as a whole, 167 farm boys reach maturity for every 100 older farmers who die. With the present number of farms, only 3 out of every 5 young men on farms have a chance to stay there. Fortunately, the door is open to industrial opportunity, provided action to develop it takes place on a sufficient scale.

It should be noticed that the opportunity will not develop of itself. On the contrary, some current happenings such as the suspension of war industries tend to restrict it, with resultant bad effects on employment and incomes. Many rural areas are feeling this set-back; other rural areas, which heretofore have had some local industrialization, are suffering from declines in natural resources. Some communities have taken organized action to improve their local industrial pattern, and legislation has been introduced in Congress which would encourage other areas to do likewise. Noteworthy pioneers in the community movement for local industrialization are Fort Smith, Ark., and Anderson, S. C. Aided by technical assistance from this Department, they have made comprehensive analyses of their community problems.

Study of the problem broadly has revealed rural opportunities in the marketing and processing of farm products. Such opportunities are particularly numerous where local industries are developing, since this development necessarily involves increased food demands.

Great advances seem to be impending in frozen foods, in the prepackaging of fruits, vegetables, and meats, and in self-service retailing of clothing and other textile products as well as foods. Many persons are optimistic with regard to the possibilities of precooked frozen foods, of new byproduct processing, and of air transport of foods and other farm products.

Tie-Up With Rural Electrification

The Nation-wide program of rural electrification ties in closely with rural industrial opportunity. Rural Electrification Administration cooperatives, which already operate more than 460,000 miles of power lines throughout the Nation, are able to provide abundant electricity for industrial plants in rural areas. In turn the farmers who use electric power from REA lines reap a benefit. New industrial consumers of REA power carry part of the electrification cost, and often make the extension of electric service possible to rural areas that out of their own resources might not be able to afford it.

Many products and processes developed in Federal research laboratories, in the Forest Products Laboratories, and in the State agricultural experiment stations indicate opportunities for rural industries. Some promising ones are kiln and chemical processes for seasoning lumber, new techniques for gluing, treating, and utilizing noncommercial forest special and low grade lumber, and new methods of extracting solvents from crop residues. In fact, the list could be extended indefinitely. Experiments are going forward constantly along lines that manifestly include important industrial possibilities, such as the utilization of vegetable and canning wastes for high-quality feeds; the improved extraction of vegetable oils, flavor concentrates, starch, gluten, and other products; new ways of treating cotton and wool products; and the production of plastics, industrial proteins, and synthetic fibers.

COTTON PRODUCTION AND INCOME

The outbreak of World War II in 1939 and the developments which followed, including the attack on Pearl Harbor, cut off a large part of the world's cotton import market and caused cotton stocks to pile up in most exporting countries. At the end of the first postwar year world stocks are still large despite the following wartime developments: (1) The depletion of stocks of raw cotton and textiles in Axis countries and in occupied areas, (2) greatly expanded cotton consumption in the United States, Brazil, Egypt, Mexico, and a number of other cotton producing countries, and (3) marked reductions in cotton acreage in all of the large and many of the smaller cotton-producing countries.

In the United States the unprecedented level of consumption during the war period and two of the three smallest domestic crops in

50 years seem likely to reduce the carry-over on August 1, 1947, to the lowest level since 1929. By August 1, 1947, the domestic carry-over may be down to one-third of what it was when World War II began. A further material reduction in stocks outside the United States is also in prospect. United States and foreign cotton production in 1945 and 1946 was smaller than had been expected; on the other hand, the consumption situation and outlook are somewhat more favorable than had been expected. The strong demand is due in part to substantial downward revisions in actual and prospective production of synthetic fiber in foreign countries.

These developments, together with the inflationary situation that prevails in this country and in some foreign areas, appear to be largely responsible for the rise of domestic cotton prices in the last half of 1946 to the highest levels in about three decades. The prices received by United States farmers in September and October 1946 were more than 50 per cent higher than in the latter part of 1945. They were about 3½ times the 1935–39 average. In the last half of October, however, market prices dropped very sharply, but remained exceptionally high.

The 1946 crop is exceptionally small; yet up to mid-October it was bringing farmers the largest gross farm income, from lint and seed together, since 1925 and possibly since 1919. On the basis of the October crop estimate and the average prices received by farmers to that date, gross farm returns from cotton would have approximated 1¾ billion dollars. This would be about 2⅓ times the 1935–39 average returns, though the crop is 30 percent smaller than the average for those years. With possibly half of the crop sold by the farmers by mid-October the total gross returns to farmers from the 1946 crop will still be unusually large despite the late October price declines. Domestic production costs have increased greatly but not nearly as much as cotton prices. Prices near those prevailing in late October will encourage farmers to increase their plantings in 1947. Moreover, improvement in the farm-labor situation and in machinery supplies would facilitate increased production.

Stocks of cotton in the United States August 1, 1946, totaled 7.5 million bales. These stocks, together with the small 1946 domestic crop, indicate a United States supply for the current season (exclusive of imports) about 3 million bales smaller than that of 1945–46, and almost 8 million bales less than at the outbreak of the war in Europe. World stocks of cotton totaled about 21 million bales on August 1, 1946, and were some 4 million bales smaller than a year earlier, though about 3½ million bales larger than the 1935–39 average. The reduction in stocks more than offset an indicated increase over 1945 in the 1946 world crop. Consequently, the world supply for the current season is somewhat smaller than was that for the 1945–46 season. It is almost 5 million bales smaller than the 1935–39 average. Lack of manpower and the greater need for food production during the war years held down the production of cotton in many countries. In the United States adverse weather was a factor in 1945, as it has been again this year.

Domestic mills consumed about 9.2 million bales of cotton during the crop year which ended July 31, 1946. They will probably consume

larger quantities during the 1946–47 season. It is expected the domestic demand for cotton goods at least in the first half of the 1946–47 season will far exceed that of any previous peace period.

Exports of American cotton increased sharply after World War II ended. For the year ended July 31 last they totaled 3.5 million bales, and during the current marketing year may not equal this figure. Comparatively large exports have gone to Japan and Germany, in exchange for cotton goods. The depletion of stocks of raw cotton and of other textiles in most importing countries has encouraged exports of American and foreign cottons; yet total world shipments are still far below those of the immediate prewar years. Foreign mills are still consuming less cotton than before the war, though their consumption is increasing.

But with United States mills consuming more, the total world consumption in the year ending July 31, 1947, may not be much if any smaller than the 28½ million bales consumed in 1938–39.

Long-Time Aspects of the Domestic Situation

Yet even with the exceptionally favorable demand and supply conditions now prevailing, certain farming areas dependent upon cotton growing for a large part of their cash income still have inadequate incomes and underemployment. Output per man (pounds of cotton and other commodities produced) is often so small that continued high cotton prices would not solve the income problem. In some areas, to be sure, output per man has been increased by the use of efficient, mechanized-production methods. In such areas the incomes of the cotton farmers often compare favorably with those of progressive farmers in other regions, and with the incomes of many nonfarm groups. A strong cotton-production system is emerging in the most efficient cotton-producing areas which is capable of paying high wages to the skilled labor it requires. Elsewhere high industrial activity is encouraging certain desirable population and production changes. Abundant off-farm employment opportunities exist, as well as farm opportunities in dairy production, oilseeds, truck crops, and livestock.

Continued high industrial employment in the United States, plus favorable world-demand conditions should hold domestic consumption plus exports pretty well in line with our production of cotton on the average. But if industrial employment should fall back to the level of the middle 1930's and if unfavorable demand conditions abroad should develop, domestic consumption and cotton prices would undoubtedly be lower. Paradoxically, under such circumstances production of cotton might be stimulated through the backing-up of labor into certain areas, combined with reductions in the demand for other farm products.

Two developments in 1946 with respect to international cotton organizations deserve notice. The Food and Agricultural Organization of the United Nations initiated its fiber work during April, and the fifth meeting of the International Cotton Advisory Committee took place in Washington from May 7 to May 14.

The preliminary fiber work of FAO is of an exploratory nature. It studies world fiber problems to determine the proper field of FAO operations and to discover what information and statistics are lacking

which FAO will need for future action. Production and consumption problems pertaining to cotton receive particular attention since cotton is the most important world fiber.

The ICAC received a report from a group appointed to study possibilities for an international cotton agreement. An international agreement was not reached; yet considerable progress from an organizational standpoint resulted. An executive committee of representatives from Argentina, Brazil, Belgium, Canada, China, Czechoslovakia, Egypt, France, India, Peru, the United Kingdom, and the United States of America was established.

This committee will seek to establish cooperation with FAO and other international organizations; to provide a medium for exchanging views in regard to cotton developments; and to develop further the work on an international organization to deal with the world cotton situation. It will maintain at Washington a secretariat for supplying information and will make preparations for the next meeting of the ICAC. A budget of not to exceed $50,000 was established for the executive committee's work.

LIVESTOCK AND FEED

The end of the war brought no let-up in the strong domestic demand for meats. Consumer expenditures for commodities and services during 1946 were above the record of 1945. In addition, a pressing need developed for meat to feed people in European countries. Actions by the Department of Agriculture to speed meat shipments to starving people overseas included increases in the first half year in the meat set-asides, and cooperation with the Office of Price Administration in a slaughter-control program to prevent diversion of livestock to the black markets. Military purchases of meat dropped sharply below those of 1943–45; but this reduction was partly offset by an increased domestic demand, as military personnel returned.

Meat production continued at near record levels in 1946. Moderately below the 1945 production of 23 billion pounds, it was around 40 percent greater than the annual average production of 16 billion pounds in the period 1935–39. Pork production was up moderately from the 10 billion pounds produced a year earlier. Beef and veal production, while still large, fell below the record of 11.8 billion pounds in 1945. After the pronounced wartime decline in sheep numbers, lamb and mutton production in 1946 was the lowest since 1941; yet it was above that for any prewar year.

Exports of meat in 1946 were above the 1.2 billion pounds shipped in 1945 though below the record of 2.5 billion pounds in 1943, in which year the trade was largely on lend-lease account. Meat exports in 1946 were distributed in large part by UNRRA. Other large recipients were France, Belgium, the Netherlands East Indies, and the United Kingdom. In prewar years these countries, with the exception of the United Kingdom, were not important markets for our meat.

Civilians in the United States consumed 10 pounds more meat per capita in 1946 than in 1945, or about as much as in 1944, when civilian consumption was estimated to be 148 pounds per person, the highest

in over 30 years. With meat unrationed and prices held down by price controls during a good part of the year, civilians would have purchased more meat in 1946 had larger supplies been available.

Cash receipts from farm marketings of meat animals in 1946 exceeded the 5.8 billion dollars received in 1945 and also the previous record of 5.9 billion dollars in 1943. Marketings were smaller than in 1945; prices to farmers, however, reached the highest levels since 1919. Production costs were higher than in 1945; yet 1946 was another good year for meat-animal producers, especially cattlemen.

Meat-Animal Trends and Prospects for 1947

Cattle numbers increased rapidly in the early war years and at the beginning of 1944 reached an all-time high of 82 million head. They declined in the following 2 years. A further decline is in prospect. In fact, the down trend may continue for several years, principally from large cattle and calf slaughter, especially of breeding stock. Slaughter will probably continue large for 1 or 2 years more; thereafter, it is expected to decline sharply.

Sheep, which declined one-fourth in number from the beginning of 1942 through 1945, continued to decline in 1946 but at a slower rate. In 1947 the number on farms and ranches may stabilize or increase, especially if lamb prices rise. A larger supply of farm labor may tend to check the decline. In 1946 the Commodity Credit Corporation reduced selling prices for domestic wool and brought them more nearly into line with the prices of imported wools. Government-owned stocks of wool were still large in late 1946. Meantime, world stocks remained excessive. It may be 5 to 10 years before they return to normal levels.

Shortages of feed concentrates and an unfavorable hog-feed price ratio caused a marked decline in the 1946 fall pig crop. The 1945 fall crop was 35 million head. A large corn crop was harvested in 1946, however, and the 1947 spring pig crop may be at least as large as the 53 million saved in the spring of 1946. The reduction in the 1946 fall pig crop will result in lower pork output during the spring and summer of 1947 than in the spring and summer of 1946.

Diminished hog slaughter, the decline in the number of cattle on farms and ranches, smaller marketings of sheep, and the prospective smaller lamb crop in 1947 may reduce meat production in 1947 by 1 billion pounds compared with that in 1946. The underlying export demand for meat is likely to continue fairly strong. Meat-animal prices should remain high as long as domestic business activity also continues at a high level.

Our livestock industry has potentialities for a much higher production than in prewar years. Cattle numbers, despite the decline in 1944 and 1945, were higher in 1946 than in any previous peacetime period. Hog production can be expanded quickly; it is largely determined by corn and other feed-grain production and by price and profit incentives. The war years demonstrated the Nation's ability to produce feed grain. Further increases in the acreage of hybrid seed corn, along with more use of improved varieties of fertilizer, of improved cultural practices, and of soil-conserving measures will insure continued large feed-grain crops and consequently large hog production, given average or better than average weather conditions. The

sheep industry of the United States begins the peacetime era with the lowest number of breeding stock in about two decades. But as a whole the livestock industry has much expansion capacity.

Feed Supply in Early 1946

In the first half of 1946, the feed supply situation was critical; it developed shortages despite relatively large supplies of feed grains per animal and a near record output of byproduct feeds. Chiefly responsible were high rates of livestock feeding, the result early in 1946 of favorable livestock-feed price relationships and of the relatively low feeding value of soft and wet corn in some important producing areas. Most affected by the tight supply were users dependent upon commercial sources. The demand by mixed feed manufacturers, livestock producers in deficit feed areas, and grain processors was as strong as or stronger than during the war years.

Several measures were taken by the Department to ease the supply situation and provide additional food for foreign areas. These measures included restrictions on the purchase and use of feed grain and a corn-purchase program under which nearly 34 million bushels of corn were obtained for export. Early in May a new grain price policy, announced jointly by the Office of Economic Stabilization, the Department of Agriculture, and the Office of Price Administration, provided upward adjustments in ceiling prices of grains and byproducts feeds. The increases ranged from about 8 to 35 percent and sharply changed the price relationships between feed and livestock products. These changes and lapse of price control in July caused livestock feed-price relationships to become unfavorable, particularly for hog and poultry producers.

Owing to an unusually heavy disappearance of feed grain, the carry-overs of corn and barley declined to relatively low levels. On the other hand, the carry-over of oats, following record production in 1945, was the largest in recent years. In favorable weather the planting of feed-grain crops took place earlier than usual in 1946 and a good growing season gave large crops. Corn and oats production reached record or near-record levels. Since fewer numbers of livestock remained on farms and ranches, the feed-grain supply for the 1946–47 season is ample for all indicated domestic requirements and provides some surplus for export.

TOBACCO CONDITIONS IN 1946

Conditions in 1946 have been favorable for tobacco. Despite cutbacks in military requirements and the termination of lend-lease, total use of leaf in domestic factories has been near the wartime peak, whereas exports have exceeded prewar levels. This year's crop is a bumper, and early sales by growers have been at record prices.

Cigarette consumption in this country during the last year has been at an all-time high. Cigarette production, about 80 percent of all tobacco products, has been near the peak reached during early 1945, though overseas shipments have taken only about 10 percent of the total as compared with more than 30 percent at the height of the war. With larger supplies available, cigar consumption has increased.

Smoking-tobacco consumption, however, has fallen sharply during the year, primarily because more cigarettes have been available. During periods of high income consumers show a preference for cigarettes. After closing of war plants, where smoking was generally prohibited, the consumption of chewing-tobacco products declined. It is again on the down grade.

Tobacco stands high among agricultural commodities in international trade. The United States is the most important tobacco-exporting country. Stocks of tobacco in many foreign countries during the war became very low and in some instances disappeared. Hence keen competition resulted this year for exportable supplies, and as mentioned, the movement from the United States exceeded prewar levels. It reflected requirements both for immediate consumption and for rebuilding stocks.

It is expected the export demand will continue strong, despite the relatively high prices and the low foreign supply of dollar exchange. The British loan and the extension of dollar credits to other nations strengthened foreign demand for American tobacco. Shortly after VJ-day, the arrangement whereby the United States Government served as a purchasing agent for tobacco destined for British countries under lend-lease agreements was discontinued.

Naturally, continued high prices will encourage tobacco production outside the United States.

The tobacco crop of 1946, for the first time, exceeded 2 billion pounds. It was 4 percent greater than the previous record crop of 1945, and was 44 percent above the 1935–39 average. Goals were high to make up for accumulated deficits in both domestic and foreign supplies.

Production of all major types except Burley increased over 1945. Production of Burley was reduced because stocks had risen to near-surplus proportions and Burley is not a major export type.

Production of flue-cured tobacco, the major export type, set a new record and was somewhat larger than current world consumption. Large crops can be marketed by producers at favorable prices, however, until the world deficit is filled. When only the annual world consumption needs to be met, production will need to be cut back.

Supplies of all major kinds of tobacco for 1946–47 will be greater than for last season. Of the major cigarette types, flue-cured and Burley, the current supply of 3.8 billion pounds is 5 percent above a year ago. It is 40 percent above the 1935–39 average.

The average farm price for the 1945 crop of tobacco reached 42.6 cents per pound, an all time high. Farm value of the 1945 crop totaled 850 million dollars, likewise the largest of record and over 2½ times the value of any crop grown between 1920 and 1940.

Early sales of the 1946 crop of flue-cured tobacco indicated a higher average price than that received for the 1945 crop. Over the years the level of prices and the income from tobacco depend primarily upon the national income and secondarily upon world trade policy, international finance, and agricultural policies followed abroad.

Marketing Quotas Authorized

The 1946 crops of flue-cured, Burley, fire-cured and dark air-cured tobacco will be marketed under marketing quotas authorized by the

Agricultural Adjustment Act of 1938 as amended. Growers of fire-cured and dark air-cured tobacco, in referenda last October, approved quotas to be effective on the three crops beginning with 1946. In a referendum in July 1946, growers of flue-cured tobacco voted (about 97 percent favorably) for quotas on the three crops beginning with 1947. A similar referendum is to be submitted to growers of Burley tobacco.

Federal inspection of tobacco was broadened during the year to cover virtually all auction markets and all tobacco of the flue-cured, Burley, fire-cured, and dark air-cured types sold at auction.

Price support is mandatory for most types of tobacco; hence it is available if needed. For types sold at auction, support prices have been developed for each official grade. Applied to a normal distribution of official grades, these supports result in an average support price equal to the loan level specified for the different kinds of tobacco.

To carry out the price support programs, flue-cured tobacco growers organized a cooperative stabilization corporation similar to those operated for Burley, fire-cured, and dark air-cured tobacco.

Substantial quantities of tobacco products have been declared surplus by the armed forces. These have been disposed of primarily by resale to the original manufacturer or by sale for exportation. Such disposition likely will continue into 1947.

In order to supply insecticides the nicotine diversion program was continued this year, though on a reduced scale; approximately 5 million pounds of low-grade Burley was subsidized into the production of nicotine sulfate.

WOOL

Reconversion was effected quickly in the domestic wool-manufacturing industry, and use of wool in civilian manufactures in 1946 was at a record peacetime high, some 70 percent above the 1935–39 average. Nevertheless, through much of the year, supplies of finished products fell short of demand. In the early months of the year there was a serious shortage of men's clothing, due largely to the return of several million servicemen to civilian life over a space of only a few months. Various problems faced by clothing manufacturers in expanding their output of civilian clothing also contributed to the shortage. In 1947 supplies are expected to be more in line with demand. But a high general level of consumer incomes and the need for replenishing inventories can be expected to maintain wool consumption at levels not greatly below that of 1946 for the next year at least.

To maintain growers' incomes, the Commodity Credit Corporation in 1946 again purchased the domestic clip at ceiling prices. Prices to growers averaged about 42 cents a pound. This average, converted to a mill-point clean-content basis, was materially higher than the equivalent duty-paid price of imported wool on a comparable basis. In order to make domestic wool available to manufacturers at prices more or less competitive with foreign wool, the CCC sold domestic wool through most of 1946 at prices which averaged about 8 cents, grease basis, less than purchase prices. Although large supplies of domestic wool were available from Government stocks, mills continued to use imported wool for a large part of their requirements and Government stocks continued large.

The rapid decline in sheep numbers and wool production which began in 1943 has continued. Production of shorn wool in 1946 was about one-fourth smaller than the 1942 record production and the smallest since 1927.

Conditions Abroad

World wool production which reached a record high during the early war years has declined considerably and is about at prewar level. Serious drought in Australia and war conditions in Europe were chiefly responsible for the decline. Production changes during the next few years undoubtedly will vary in different regions, but the stabilizing effect on world wool prices of the British wool disposal plan may help to stabilize world production at the present level or moderately higher.

International trade in raw wool increased sharply in 1946. In part, this movement represents a shift in stocks from producing centers to consuming centers. During the war, continental Europe, which is normally the world's largest importing area, was largely cut off from imports and stocks there were reduced to abnormally low levels. Although hindered by fuel shortages and transportation difficulties, mill consumption in liberated countries has increased considerably from the low wartime rate. But consumption is still far below prewar. Prospects for continuing improvement in Europe and relatively large consumption in the United States, the United Kingdom, and Southern Hemisphere countries in the next several years give hope of a gradual liquidation of large world stocks; but this will require a number of years of above-average world consumption.

In early 1946, the Governments of the United Kingdom, Australia, New Zealand, and South Africa formed what is called the British Joint Organization. Through this organization they are cooperating to market the large Government-owned stocks accumulated during the war and to support prices of new clips in the British Southern Dominions while these stocks are being liquidated. The organization will regulate offerings of carry-over and new clip wools, and will buy British Dominion wool at a "stabilization price" if the wool is not sold to commercial interests at this or a higher price. It is to the advantage of United States wool growers and consumers to have wool prices stabilized in the major foreign producing countries. Changes in domestic prices, except where the Government intervenes, usually follow changes in foreign prices quite closely although domestic prices are maintained at a much higher level than those in foreign exporting countries by the duty of 34 cents a pound, clean content, on most United States imports of apparel wool.

WORLD SHORTAGE OF FATS AND OILS

The world shortage of fats and oils continues. Liberated Europe wants at least its prewar volume of imports, but production in many sources of supply is below the prewar level. Consumption in several European countries is less than 50 percent of the prewar consumption. Even the United States could have consumed in 1946 an additional million tons of fats and oils had the supply permitted. World import requirements for 1946 are from 5 to 6 million short tons. Sup-

plies available for export from all sources are estimated at less than 3 million tons.

World production of 21 major fats and oils during the period 1935–39 averaged about 21.5 million short tons in terms of oil. This total included all of the important vegetable oils, such as soybean, cottonseed, peanut, sunflower, flaxseed, coconut, and palm oils; the animal fats—lard, tallow, butter; and the whale and fish oils. It is an estimate in terms of oil available for consumption after deductions for seed, and feed, and consumption as commodities other than fats and oils. World production of these same fats and oils in 1946 may be 17.5 million tons—80 percent of the prewar level. The decline is the result of wartime blockades, enemy occupation of producing areas, and inadequate shipping. Production of the coconut and palm oils declined most, and the output of marine oils declined sharply.

Some increases took place in the war years—for example, in sunflower seed in Argentina and in soybeans in the United States. Production of sunflower seed in Argentina in 1946 reached 1,100,000 tons, as compared with only 81,000 tons in 1936. Until 1940 sunflower seed was produced and consumed in volume only in the Soviet Union. During the war, however, when it was difficult to obtain olive oil from the European countries. Argentina emphasized the production of sunflower seed. The Argentine crop in 1946 yielded from 200,000 to 250,000 short tons of oil, about half of it available for export. Thus Argentine sunflower seed oil will be an important factor in the international vegetable-oil trade.

Soybean production in the United States in 1946 was about 200 million bushels. In 1936 it was only 33 million bushels. Primarily as a result of this increase in soybean production the United States for the past 4 years has been a net exporter of fats and oils. It had previously been a net importer of nearly 1 million tons of fats and oils a year. The exports, however, have also reflected restricted domestic consumption maintained during the war years to assist the allied countries in obtaining minimum quantities of fats and oils.

In many countries that formerly supplied the world market, the production of oilseeds has decreased. Manchuria for instance, formerly produced 160 million bushels of soybeans and exported 96 million bushels. Production in that country declined materially during the war. Prospects for 1946 seem favorable; yet it is doubtful if Manchurian production will reach the prewar level for some years. Production in China reaches about 200 million bushels annually; but it is generally for domestic use. Only high prices of oil would bring substantial quantities of China's production into the world market.

European soybean production was increasing before the war, particularly in Rumania, Bulgaria, and Yugoslavia. It seems to have almost ceased with the exit of the German Army from these countries, and with the incentive lacking which was formerly offered by the German commercial companies.

World cottonseed-oil production during the period 1935–39 averaged about 1.7 million tons. It had declined by 1945 to 65 percent of the prewar production. Although this is one of the world's important sources of vegetable oil, it is largely consumed within the producing countries and only relatively small quantities move into international trade.

The major portion of the peanut crop in the United States is consumed as nuts, but of the annual oilseed crops the international trade in peanuts and peanut oil is by far the largest. These nuts are also grown extensively in India, China, and West Africa and are the most important oilseeds crushed by European oil mills.

Annual production of coconut oil and palm oil during 1935–39 was about 1,600,000 tons. In 1945 it was only about 700,000 tons. Production of copra, the source of coconut oil, practically ceased in the Netherlands East Indies, and the Philippines during the Japanese occupation. Groves were neglected but apparently only a small percentage of the trees were destroyed. Consequently the rehabilitation of the industry in these areas is proceeding rapidly. It is expected exports from the Philippines will soon be near the prewar level.

Although world exports of copra and coconut oil in 1946 may not exceed 35 percent of the prewar level of 1,300,000 tons of oil, the former level of copra production may be regained within the next few years. Production above the prewar level, however, is unlikely in the near future; no new groves have been set out in the recent years.

Production of palm oil in West Africa has been expanded rapidly during the last 40 years, and the expansion may continue. Practically no palm oil has been delivered from the Netherlands East Indies since VJ-day, and political unrest there makes uncertain the date when exports can be restored in volume.

The United States faces a serious shortage of industrial oils. World production of drying oils has declined only slightly below that of prewar years; yet our inability to obtain Argentine flaxseed or linseed oil and the availability of only small quantities of tung and perilla oil from Asia, have reduced our supplies this year. Greater quantities of soybean oil and dehydrated castor oil, if these are obtainable, will probably be used by the paint industry. The tremendous demand for drying oils in the United States and Europe has accentuated the world shortage, but with attractive flaxseed prices and favorable weather conditions the world supply of linseed oil may be increased in the course of the next few years.

World production of animal fats is lower than before the war. Butter production has declined to about 75 percent of the prewar level. In Europe the decrease reflects a reduction in cattle numbers; in the United States butter production has fallen because of greater fluid-milk consumption. World production of lard has dropped to about 80 percent of the prewar level because of the large reduction in European hog numbers. In the United States, lard production is above the prewar average though below the 1944 record. The United States contributes about 75 percent of the lard which enters international trade; hence the reduction here from the 1944 levels will involve a shortage of lard for export.

World tallow production in 1946 is slightly above the 1935–36 level in spite of decreased production in Europe. Increased cattle slaughter in the United States and in South America has more than offset the decreased production in Europe. International trade in tallow, however, is relatively small. The United States during the past 10 years has been a net importer of tallow.

Whale-oil production during the period 1935–39 averaged nearly 600,000 short tons. This high production, however, was rapidly de-

pleting the whale population in the Antarctic. An international agreement now limits the total catch to about half the prewar level; hence whale-oil production may never again reach the former high figure. In Europe whale oil competes directly with other edible oils. Little is imported into the United States.

In sum the fats and oils available for international trade add up to only about half of the prewar volume. The quantity for export may remain below prewar levels for some years, because several producing areas such as India may consume a larger quantity domestically. On the other hand the world import demand may be smaller than before the war. Germany, formerly a large importer, may not be in a position to procure large quantities, and other countries may subsidize domestic production. In several European countries, however, the demand should be strong because of high industrial activity.

In the Latin American countries increased buying power may keep up the demand for oils. In the United States and Canada industrial activity may be expected to create a strong demand for both edible and industrial oil. Production of fats and oils will probably expand during the next few years. How long it will take for output to equal consumption needs will depend on the weather in the major production areas, on political conditions in some areas, and on the ability of deficit countries to finance imports.

FRUITS AND VEGETABLES

As during the war years farmers in 1946 produced bountiful crops of fruits and vegetables. Aggregate production set a new record, slightly above the tonnage of 1945. Numerous individual crops set new records—including grapefruit, peaches, pears, plums, almonds, onions, lettuce, tomatoes, melons, and processing green peas. Various others were near record and well above average. The large potato crop was exceeded only by the 1943 crop. The apple crop was near average and well above the short 1945 crop.

Supplies of most fruits and vegetables available for domestic consumption in 1946 were the largest in several years. This resulted mainly from the large commercial production, increased imports of bananas, and sharp reductions in military takings. Production in farm and home gardens and orchards again was large, and canning and preserving of fruits and vegetables again was encouraged.

Demand for the 1946 crops of fruits and vegetables continued strong, and prices received by farmers for fruit averaged near those of 1945, but for potatoes and fresh vegetables, they averaged somewhat below. The combination of large crops and high prices resulted in cash incomes to farmers comparable with the high incomes of recent years.

Commercial exports of a number of fresh fruits increased in 1946 but did not reach prewar levels. The unusually large supplies of potatoes made it possible to make unprecedentedly large exports to Canada, France, and Belgium, where supplies were very short. Furthermore, substantial quantities of other fruits and vegetables, including surplus dry field peas, were shipped in 1946 as in 1945 to help alleviate the critical food shortages in war-torn areas, especially Europe. In such export, the Department of Agriculture rendered

material assistance in accumulating supplies and facilitating their shipment.

Large-scale Government price support operations were required in 1946 to keep prices of potatoes from dropping below support levels because of large market supplies. In addition, some limited surplus removal operations were conducted for onions, cabbage, and spinach. Unusually large quantities of early and intermediate potatoes were purchased by the Department of Agriculture in late spring and summer and diverted to the manufacture of alcohol. The removal of these potatoes from the usual trade channels not only gave support to potato prices but also provided raw material for alcohol at a time when the usual grain supplies were more urgently needed abroad for relief feeding. The Department gave further support to prices through loans to induce more orderly marketing of the storable portion of the crop.

In contrast to 1945, many of the major fruits and vegetables grown in 1946 were free of ceiling-price regulations. For those still under ceilings, market prices tended to be below ceiling levels mainly because of the large supplies. With these conditions of large supplies and generally free markets, strong emphasis, as in prewar years, was again placed upon size and quality as factors in price. This was reflected in widening price differentials for different market classes in contrast to the narrow range or even single price often observed for short supplies of fruit and vegetables selling at or near ceilings.

POULTRY AND EGG PRODUCTS

Varying circumstances substantially affected the poultry industry. Supplies of all poultry products were short of demand in the early part of the fiscal year until the close of the war. Egg production was relatively high; but the shortage of meat created an extremely high civilian demand for eggs. Coupled with military demands and continued lend-lease requirements, civilian demand provided ample outlets at good prices.

War Food Orders controlled the marketing of chickens from commercial broiler areas and in the Midwestern States. These orders were necessary to help meet military requirements. We had record production of turkeys; yet a War Food Order was necessary in order to obtain turkeys to meet military needs. The situation changed quickly, however, when the war ended. Egg prices in the midwestern areas fell to low levels. Heavy production continued with questionable outlets, and the market was uncertain. This condition lasted through September; thereafter egg prices increased.

War Food Orders controlling the marketing of chickens and turkeys were terminated immediately after the close of the war, and handlers found themselves with excessive supplies. This situation tended of course to weaken market prices, particularly in commerical-broiler areas. Prices to producers fell by February to distress levels. However, the 1946 turkey crop was marketed with little difficulty, except with respect to heavy turkeys.

About January 1 it became evident that feed would be scarce during the remainder of the 1946 feeding year. The market demand for

eggs, chickens, and turkeys was satisfactory; no bothersome surpluses of these products were imminent. Nevertheless, a reduction in poultry population was necessary, for the sake of adjustment to available feed stocks. This confusing circumstance was felt in the latter months of the 1946 fiscal year.

Production of eggs in the fiscal year 1946 totaled about 154 million cases, about 2½ percent below the record production of 1943–44 and slightly below that of the preceding year. It was 45 percent above the 1936–41 average production and provided substantially greater quantities of eggs for the domestic market than in any prewar year. Consumption of eggs per capita in the fiscal year averaged about 390, a record level.

In the last half of the fiscal year the Department purchased about 7 million cases of eggs in dried and frozen form for the British Purchasing Commission. This purchase took the place of a price-support purchase program. Prices would have fallen below support levels in the absence of egg purchasing by the Government. During the first half of the 1946 calendar year, egg prices averaged 97 percent of parity.

Chicken and Turkey Meat

Farm chickens raised in 1945 were about 10 percent more numerous than in the previous year, and about 25 percent above the 1937–41 average. This production, however, was 12 percent below that of 1943. Commercial broilers raised reached an all-time high of 312 million head, about three times the number produced in the 1937–41 period, and about one-third greater than in the preceding year. Turkeys raised in 1945 totaled 44.8 million, another record. This exceeded the previous year's production by 23 percent and the 1937–41 average production by 46 percent.

Nevertheless chicken and turkey meats during the first half of the fiscal year brought prices generally satisfactory to producers. High production depressed commercial-broiler prices in February 1946. Heavy production continued until the feed situation became critical. Poultrymen then changed their plans, and substantially reduced production in young stock. Turkeys brooded during the second half of the fiscal year 1946 were down about 15 percent below the previous year; commercial broiler production about 30 percent; and the number of young chicks raised on farms was down to about the 1936–41 level.

Small-Type Turkey

Since about 1930 there has been a simultaneous increase in the number of turkeys raised and in the average size of turkeys produced. However, there has not been a corresponding increase in the demand for the heavier birds, and this has resulted in a price differential of from 1 to 6 cents per pound in favor of smaller market turkeys. This demand on the part of consumers seems to be based on sound considerations and is likely to be permanent. In view of this trend, the Department in 1934, at Beltsville, Md., began an experimental project on the development of a small-type turkey. Marked progress has been made in fixing the desired characteristics in this small-type turkey.

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Several standard varieties, the wild turkey, and White Austrian turkeys imported from Scotland have been crossed in the development of this small-type turkey. From the crossbred progeny selections are being made. The chief characteristics desired are as follows: Live weight of young toms at market age, 12 to 17 pounds; corresponding weight of young hens, 7½ to 10 pounds; color, white; compact body with moderately short legs, moderately long keel bone, and an abundance of meat, especially on the breast and legs; early maturity, resulting in a finished condition (U. S. Prime) with respect to fat, fleshing, and feathering at the age of 24 weeks; reasonably high egg production and high fertility, hatchability, and viability.

MILK CONSUMPTION CONTINUES UPWARD

The wartime increase in fluid-milk consumption continued into 1946. When the year began, numerous fluid-milk markets, particularly along the east and west coasts and in the South, had not enough milk to meet demands for fluid-milk consumption at ceiling prices. To help meet this demand, milk was being shipped from Minnesota and Wisconsin to eastern and southern points.

The shortage was attributable less to a reduction in production than to an increase in the demand, enhanced in effectiveness by the fact that prices of fluid milk were held relatively low by price ceilings accompanied by substantial dairy production payments to milk producers.

Milk production during 1946 was somewhat below the record production of over 122 billion pounds produced on farms during 1945, but it was well above the prewar average.

The number of milk cows on farms on January 1, 1946, was about 3 percent below that of January 1, 1945. Replacement stock was less than a year earlier—7 percent in heifers 1 to 2 years of age and 6 percent in heifers over 1 year of age.

The increase in fluid-milk consumption, promoted for years by the dairy industry itself and augmented during the war years by shortages of other food plus higher consumer incomes, required considerable diversion of milk from manufacturing to the fluid-milk markets. Production of manufactured dairy products declined, particularly of Cheddar cheese, evaporated milk, and butter. During the first 4 months of 1946, less milk went into the production of Cheddar cheese, evaporated milk, and butter than had gone into these products during the corresponding months of any of the last 20 years. On the other hand, production, which has been restricted during the war by War Food Orders, such as output of ice cream and of cheeses other than Cheddar, expanded in 1945–46.

This reduction in the output of principal manufactured dairy products, along with unexpected demands for dairy products for famine relief and for war service agencies, required reissuance of some War Food Orders which had been suspended or terminated. Set-aside orders on Cheddar cheese, nonfat dry-milk solids, and butter were reinstituted. Evaporated milk, which had not been subject to a set-aside order during the war, was made subject to such an order on June 1, 1946. An order prohibiting sales of whipping cream was reinstituted.

Feeding as Basis of Expansion in Output

Because cow numbers were lower than in 1945, means of holding or expanding milk production were confined in 1946 largely to increased feeding. The Department urged farmers to retain and liberally feed their cows. Shortage of grains, of mill feeds, and of protein supplements, however, was a limiting factor, offset to some extent by the use of improved seed and by increased fertilization of pastures and hay crops. The Department also urged conservation of feed used for other livestock, especially poultry and heavy hogs.

Price ceilings on dairy products and the rate of the dairy production payments were increased to offset increased feed and labor costs. On January 29, 1946, the Director of Economic Stabilization announced that the general level of returns to milk producers would be maintained during 1946 at the 1945 level to encourage attainment of 1946 dairy production goals.

On April 15 another anouncement by the Director of Economic Stabilization indicated dairy production payment rates during May and June would be increased 20 cents per hundred pounds of milk above the corresponding period of 1945. An additional increase of 20 cents per hundredweight in the rate on milk was announced to become effective July 1. This increase was to be accomplished through upward adjustments either in ceiling prices for dairy products or in the dairy production payment rate.

On May 29 the Director of Economic Stabilization announced an increase of 40 cents per hundredweight of milk, to become effective as soon after June 1 as could be arranged through adjustment of price ceilings. Half of this 40 cents was to take care of the 20 cents previously announced on April 15 to be effective July 1; half of it was intended to offset increased feed costs resulting from upward adjustment in feed price ceilings.

It was indicated in these announcements that any removal of subsidies on milk and butterfat would be covered by corresponding adjustments in price ceilings so that farmers' returns for milk could be maintained.

SUGAR SITUATION AND POLICY

Twelve months after the capitulation of Germany and Japan, effects of the war were still evident in depleted sugar supplies. Beet-sugar production in Europe from the 1945 crop was only a little over one-half the prewar level. Java and the Philippine Islands, the great exporters of the South Pacific, were practically out of sugar production; Formosa was producing only about 15 percent of its prewar output. Production in Cuba increased greatly during the war period; but increase there was not sufficient to offset great declines in Europe and the Orient. World production of beet and cane sugar in 1945–46 was only 27.2 million short tons (raw value), compared with a prewar (1935–39) average of 34.5 million tons.

With world sugar production down nearly 7.5 million tons from the prewar level, it was necessary to continue international programs for allocating world supplies among consuming countries, and to continue sugar consumption and price controls in the United States and

other sugar importing countries. Total imports of sugar into the United States in 1946 were below the prewar level, partly because of the lack of available supplies from the Philippines, and partly because of the necessity to share the reduced world output with other countries.

For the calendar year 1945, the limited supply of sugar available to the United States and some of its allies was divided among certain neutrals, liberated areas, the United States, United Kingdom, and Canada on the basis of a parity formula developed by the Interagency Committee on Foreign Shipments in 1945. The recommended allocations provided that the available supplies should be so divided as to provide an identical per capita consumption of cane and beet sugar for the United States, the United Kingdom, and Canada. Smaller amounts were allocated to other areas on the basis mainly of their prewar consumption.

It was not possible during 1946 to increase sugar rations as much as was anticipated just after VJ-day. The Cuban 1946 crop of 4,450,000 tons, although nearly 500,000 tons greater than the 1945 crop, was materially below early expectations and the Puerto Rican crop yielded only 910,000 tons of sugar compared with the initial estimate of 1,100,000 tons. Rationing during the 1945–46 fiscal year, however, was more efficient than in the previous year. This country was able, while contributing to world food needs, to increase the ration of industrial users to 60 percent of the 1941 base by April 1, 1946 (as compared with the 50-percent level in effect during the preceding 9 months for most industrial users). Out of the total Cuban exportable surplus of 4,150,000 tons in 1946, about 2,000,000 tons was earmarked for other countries, principally the United States, Canada, France, and Holland.

Stocks of sugar have been so nearly depleted that it has not been possible to maintain perfect distribution, or to have sufficient supplies available for meeting ration needs in all parts of the country at all times. Supplies available for civilian consumption in 1946 in the United States are estimated at 73 pounds per capita, compared with the prewar average of 96.5 pounds per capita. The great increase in United States consumer purchasing power would have caused sugar consumption in the United States in 1946 to exceed the prewar level had sufficient supplies been available. Consumption in the United States is higher than in other important importing countries with the exception of the United Kingdom and Canada, which have per capita supplies equal to ours. Nevertheless, it has been extremely difficult for consumers and manufacturers in the United States to adjust themselves to the relatively small available supplies. The various controls have helped in maintaining an equitable sharing of the short supplies.

Sources of the Supply

Normally, about 55 percent of the sugar consumed in this country has come from production in the continental United States, Hawaii, Puerto Rico, and the Virgin Islands. Of the remaining supply approximately 2 million tons have come from Cuba and nearly 1 million tons from the Philippine Islands. No sugar is now available from the Philippines. That country had to import sugar in 1946.

War damage to the sugar industries of Java, Formosa, and the Philippines was very great. As compared with a prewar average

production in these three areas and Japan of 4,000,000 short tons, the 1945 production was barely 400,000 tons. Moreover, internal political and revolutionary disturbances in Java and disorganization of transportation facilities there delayed the movement of stocks from the interior to the seaports.

This development was in marked contrast to what happened after World War I. The armistice freed 1 million and a half thousand short tons of sugar which had accumulated in Java. At that time, of course, Japan fought on the side of the Allies and Formosan and Phillipine production remained undisturbed.

Production for the 1945–46 season in North and Central America and in the West Indies totaled about a million tons more than the prewar average. Cuban production was about 1.3 million tons above prewar. Beet sugar production throughout the world declined nearly 5 million tons below prewar levels, the decline being largely in Europe. A reduction of about 3.6 million tons occurred in the world's cane sugar production.

Production will be slow to recover in the exporting countries of the Orient, and will take an additional year or more to recover fully in Europe. It is probable, however, that 1946 and the early months of 1947 will mark the low point in total available sugar supplies. Thereafter, at least partial relief from the world shortage may be expected though world supplies will not be ample until production is restored in Europe and the Orient.

Meantime, some of the ex-enemy countries will have to rely on their small domestic production.

Government Purchases of Sugar

The United States has purchased Cuba's entire output, except supplies required for Cuban domestic consumption and a small quantity reserved for free export. It has done so since the beginning of the war. Likewise, the United Kingdom has purchased the entire exportable supply of the Dominican Republic. Supplies so purchased by these two governments, along with other available supplies, have been subject, however, to international allocation, formerly by the Combined Food Board, and now recommended by the International Emergency Food Council.

Negotiations were undertaken in mid 1945 for the purchase of the 1946 and/or 1947 Cuban crops, in the hope that there would thus be ample time to reach an agreement and remove all uncertainties prior to the beginning of the 1946 marketing season.

After VJ-day the thoughts of Cuban producers turned to consideration of postwar prospects. During the war years, Cuba's contribution to the United States market was far greater than the quantities which would have been admissible from Cuba under the Sugar Act quotas, had these been operative. Hence in negotiations for the purchase of 1946–47 crops the Cuban Government felt obliged to raise the problem of our postwar quota policy. The Secretary of Agriculture had the responsibility of protecting domestic producers as well as consumers and was unable to give assurances satisfactory to the Cuban Government on postwar policy in view of pending legislation in Congress.

On the other hand legislation looking toward permanent resumption of quota control with its accompanying threat of sharply reduced production in Cuba should price-depressing surpluses develop would interfere with Cuban production at maximum levels during the next several years. The fullest possible production during these years will be needed for the canning, preserving, baking, and other food trades, for household requirements, and for minimum foreign needs. The dilemma was finally resolved by an enactment of a congressional resolution continuing the Sugar Act of 1937 for 1 year as an interim action. Decision by the Congress and the Administration on permanent postwar policy regarding sugar quotas has thus been deferred.

Almost simultaneously with the legislative decision, the contract with Cuba on the 1946 and 1947 crop purchases was concluded. This agreement establishes a basic price of 3.675 cents per pound f. a. s. Cuba, subject to upward modifications under certain conditions, principally an increase in food costs or living costs as listed by the indices of the United States Bureau of Labor Statistics. The latter provision protects Cuba against a rise in prices of food and other commodities that enter into the cost of living. Cuba principally purchases these items in the United States. The basic price for the 1947 Cuban crop will be the maximum price which may be paid during the year 1946 by the United States.

Programs to Encourage Production

After the outbreak of the war, programs were conducted to encourage sugar production in continental United States, Hawaii, Puerto Rico, and the Virgin Islands. These included provisions for insuring returns to growers; for getting prisoners-of-war, foreign workers, and other laborers; and for assisting sugar producers in obtaining fertilizers and equipment. In addition, the programs assisted sugar processors, and promoted shipment of a more equitable share of sugar into consuming areas. The programs helped to offset the various handicaps to wartime production, but did not enable producers to maintain the full prewar level of production in continental United States and off-shore domestic areas (Puerto Rico, Hawaii, and the Virgin Islands). The increase of nearly 30 percent in the United States 1946 sugar-beet crop, however, shows the effect such programs will have when the other impediments to production are eliminated.

NEW ERA IN MARKETING

This country is entering a new era in marketing, with important prospects in air transport, in food freezing and other new forms of processing, in the prepackaging of perishables, in lower cost retailing not only of food but of fiber products, in the development of new industrial uses for farm products, and in the improvement of marketing structures and equipment. Ultimately the innovations will bring reductions in marketing costs. Possibilities cannot be gaged merely from comparisons between what the old and the new methods cost right now. Such comparisons ignore the rate of technological progress. New developments in marketing generally involve relatively high costs at first but should not be underestimated simply on

that account. Current pioneering in air transport, food freezing, prepackaging, and industrial utilization reveals dynamic elements of great importance.

Air Transport

Air transport illustrates the danger of thinking in terms of past conditions and costs. Not many years ago air transport of agricultural perishables was so much more expensive than rail or water transportation that some research men thought the gap would remain prohibitively wide for decades if not permanently. Yet certain air cargo handlers now have plans based on rates of 10 cents per ton mile or lower. This is more than rail cost but will have important offsets in marketing costs. Lighter containers can be used, refrigeration costs are cut, and some packing costs are eliminated. Moreover there are gains in freshness, better taste, and nutritional values, since air transport permits harvest at height of maturity. Willingness of consumers to pay higher prices for air-transported products was demonstrated by test sales made at Detroit food stores of lettuce flown overnight from California. Typical air shipments of perishable foods in 1946 were strawberries and avocadoes from Florida to New York, with return planes flying replacement parts for broken machinery and latest fashions from New York department stores. The view is now generally accepted that air transport will eventually prove an important though not dominating factor in transporting fruits and vegetables.

Outlook for Developments in Frozen Foods

It may be some years before frozen foods take over any sizable proportion of the total consumption of fresh and processed fruits and vegetables, but the trend is in that direction. Frozen fruits and vegetables have several definite advantages. They are easier to buy, require no preparation for cooking, keep indefinitely in the freezer compartment of the refrigerator, eliminate waste, maintain uniform quality, and offer a good variety from which the buyer may select. Biochemists report that the vitamin content is good. Compared with fresh produce, the frozen foods may be a little inferior in vitamin content and palatability, but in these respects they have no disadvantage in comparison with canned fruits and vegetables. More costly at present, frozen fruits and vegetables may be expected to overcome this handicap eventually, particularly with improvement in trade facilities for distributing and home facilities for keeping them. On the other hand, improvements in the handling of fresh and canned products, such as in prepackaging and in preservation methods, may prolong the competition, with benefit to both producers and consumers.

Although interest in frozen foods has centered mainly around fruits and vegetables these commodities are exceeded by other foods in potential dollar volume for freezing. Indications are that meats and poultry are now gaining consideration for the freezing process. To consumers, frozen meats offer assurance of more uniform quality. Their appeal to packers is in their adaptability to branding and advertising, and for the retailer they have the highly important feature of being better adapted to self-service sales than fresh meats. In addition to frozen meats, the reduction in distribution costs which

might result from the sale of fluid milk in frozen form points to increasing interest in this field. Also the practicability of frozen precooked foods was impressively demonstrated in plans announced in 1946 for their use by railroads, airlines, and steamship lines.

Innovations in Packaging

Innovations center around packaging, many of them started during the war years. Preparation of foods for military and lend-lease shipment developed numerous successful experiments, some of which will have permanent value. Semiautomatic machine methods of packaging came widely into use; packaging materials changed; mass food retailing influenced packaging technique.

Experimental operations in prepackaging of fresh fruits and vegetables indicated possibilities of effecting savings in transportation costs, as well as reductions in waste of produce. Packaging at the point of origin will save labor in retailing; moreover, consumers are favorably inclined toward prepackaged products. This lessening of waste and saving of labor should help to offset the increased handling cost.

Progress continued in the handling of bulky, less perishable products, not well adapted to prepackaging. Such products as peas, beans, spinach, cauliflower, and broccoli benefited from trends toward increased speed in transportation, more careful handling, and better wholesaling and retailing methods. Long-run requirements included improvement in refrigerator cars, faster schedules, and better facilities at terminal points, along which lines the war years tended to inhibit progress.

New Ways for Utilizing Farm Products

Chemists found additional ways in which farm products can be utilized in industry; particulars of some recent developments appear elsewhere in this report. Many widely used products can be made from milk casein, soybeans, sugarcane bagasse, oat hulls, corncobs, straws, and other farm materials. Costs are sometimes high in comparison with the utilization of nonagricultural products. But this is not always true; moreover, as in other technology, the cost of utilizing farm materials in industry may decline. This Department's reports on the utilization of agricultural wastes and residues indicate that on balance agriculture is losing more markets to synthetic materials than it is likely to gain from the new industrial uses. Nevertheless, important possibilities exist in farm-product utilization, which should be developed. Technology is advancing and may alter the competition situation. Science is finding additional uses for crops through controlled fermentation, chemical processing, and other ways the importance of which will increase with continued drain on mineral resources. Solving the economic problems will involve marketing as well as production.

Modernization of Facilities

Programs for new construction and modernization of marketing facilities got off to a slower start in 1946 than had been expected.

There were difficulties in bringing together newly released materials and in assembling skilled labor. Plans, which toward the end of the year got out of the blueprint stage, contemplated expenditures of hundreds of millions. Food trades projected large additional construction, such as numerous streamlined wholesale plants with extensive refrigeration and storage equipment to care for the expected increase in frozen foods. New retail-store construction, mostly by established enterprises, promised to carry the total above 400,000 buildings. Manufacturers of food-processing equipment expected to acquire and modernize plants previously devoted to war work. Among other items, such manufacturers had orders for more than $600,000,000 worth of grocery manufacturing equipment. Notably the reconversion of dairy processing raised problems in the construction, location, equipment, and utilization of processing facilities.

Shifts in Dairy Processing

Wartime requirements for fluid milk and dairy products other than butter caused shifts in processing. Encouraged by attractive prices for whole milk, farmers found it less profitable to separate the cream and feed the nonfat solids to the livestock. In consequence, more than two-thirds of the nonfat solids in milk entered food markets. With milk production up nearly 10 percent from 1940, the supply of nonfat solids put into human foods increased nearly 30 percent. In 1946 the dairy-export demand was large, though military takings declined. Ultimately, however, overseas requirements may decline, and this will emphasize need for increased domestic outlets, particularly in the utilization of the nonfat solids. Changing patterns of utilization will then depend on consumer preferences. Meantime, however, the waiting demand for butter is huge. Only guesses are possible as to how the balance will work out, but a return to the prewar pattern of dairy processing is not probable.

Fruits and Vegetables; Textiles

Processors of fruits and vegetables faced new conditions in 1946. Government requirements, though substantial, declined, especially for dehydrated products. Most fruit and vegetable dehydraters ceased dehydration operations. Citrus concentrate plants had less business than in the war years but had opportunities for expanded production of straight juices. Canners ran into increased competition from quick-frozen foods, output of which was threefold greater than before the war. Bottlenecks in food packaging were far less troublesome than in 1945, though restrictions on the use of tin plate were in force. Manufacture of cans by the electrolytic method, which makes a given amount of tin go further, was a legacy of wartime experience. Facilities for livestock slaughtering and marketing were generally adequate, but shortages of motortrucks hampered shipments of livestock.

In textiles the shift to increase production for civilian use involved few changes in equipment or methods. No extensive retooling was necessary. Cotton-mill margins expressed as percentages of the price of cloth narrowed in 1944 and 1945, though absolute margins remained at the highest level in 20 years. Data are not available as to recent

changes in absolute costs per pound. But cotton textiles met in 1946 continued increasing competition from synthetic fibers, increased supplies of which became available for the civilian.

Expansion of Synthetic Plants

Further expansion of synthetic-plant capacity was in prospect, along with further technological improvement. The competitive situation may be inferred from changes recorded since 1930 in the relative mill consumption of cotton, rayon, and wool. In 1944 the proportions were about 79, 11, and 10 percent, as compared with 85, 4, and 11 percent in 1930. In the early 1930's the price of rayon staple fibers was about five times the price of cotton, and about the same as the price of wool. Currently, rayon staple fibers are about the same as cotton in price, and less than one-fourth the present price of wool. Probably future changes in these relative prices will have less importance in the substitution trend; in other words, the relative prices are likely to be more stable.

Cotton-Marketing Developments

Significant developments in cotton marketing are in prospect. For example, self-service methods may influence the retailing of textiles. Greater efficiency, lower costs, and improved methods may enter into wholesaling, along with improvements in cotton milling and textile finishing. Studies have disclosed opportunities for progress along all these lines, with possible benefit both in cotton marketings and in the farmer's share of the consumer's cotton dollar. In late 1942 and early 1943 the farmers' share of the consumer dollar spent for representative items of cotton clothing and cotton household furnishings was more than 13 percent, but by early 1945 it had declined to less than 12 percent. Margins have risen since 1943, chiefly at the retail level. Better merchandising, along with expected improvements in mill machinery and labor efficiency, should tend to reduce the margins.

Transportation as Marketing Factor

Transportation, always a big factor in marketing costs, has not eased since the end of the war as much as was expected, but the long-run outlook is favorable. In the next few years the railroads will be heavy purchasers of rolling stock and other equipment, both for replacement purposes and to make up shortages. Probably the trend toward Diesel locomotives will continue, though new steam locomotives include changes designed to contest the rise of the Diesel. Steam, however, encounters the handicap of rising coal prices. In freight cars the use of lighter materials and high speed trucks promises faster operation of freight trains. The United Fresh Fruit and Vegetables Association has recommended modernization of refrigerator cars through standard dimensions, lightweight yet rugged construction, high-speed, insulation, and other features.

Motortruck transportation will probably have to dispense for awhile with any great change from prewar models, since the demand

for volume production quickly is very strong. Subsequent models will probably include greater use of lightweight models and special alloys. Turbines may be developed to challenge reciprocating engines for motortrucks. Application of the theoretical advantages of the turbine, principally a reduction in the number of moving parts and a reduction in weight per horsepower, has awaited metals that would withstand intense heat. These are now available.

But agriculture stands to gain more from improvement in terminal-market facilities than from improvement in motortrucks. In this field improvement is greatly overdue. Few cities have facilities for unloading fruits and vegetables directly from railroad cars into the wholesale market; they must depend on truck hauls, frequently through heavy traffic. Provision of new shipping and receiving centers, of processing and storing plants, and of slaughtering and refrigerating establishments has failed in recent years to keep pace with the demand. Congestion in terminal markets and processing plants reacts on the transportation system, which must hold produce in freight cars and trucks for longer periods than would otherwise be necessary, with resulting waste both of vehicle capacity and of perishable produce.

MARKETING SERVICES BY USDA

Before World War I, agricultural marketing was regarded largely as a local problem, though some regulation and assistance by States and municipalities had developed. But the development of transportation, refrigeration, and large-scale production, especially of the more perishable commodities, had forced producers to seek markets farther and farther from home. Widespread confusion had developed in the use of terms for describing the quality and condition of farm commodities.

Various State and trade standards had been established for some commodities; but they were not uniform and consequently were not adapted to long-distance transactions and to distribution on a national and international scale. Various abuses and unfair practices had developed. Farmers badly needed a way of knowing the probable value of what they produced. Congress considered the marketing of farm commodities in interstate and foreign commerce as a proper subject for Federal legislation and passed numerous laws.

Many of these marketing statutes are standardization and inspection laws. They provide for the establishment of official standards of description, and authorize inspection and certification under certain conditions. Standards of some kind are almost as old as commercial agriculture; uniform national standards were begun in 1914 with the passage of the U. S. Cotton Futures Act. Subsequent legislation provided for the expansion in the standardization work. Official quality standards have now been developed for nearly all the important U. S. farm commodities.

The U. S. cotton and grain standards are mandatory; no other standards may be lawfully used if the cotton or grain are sold by grade and shipped in interstate or foreign commerce. In most other cases, however, the use of U.S. standards is voluntary.

Producers have discovered that grading of products brings higher market prices, prevents economic and physical waste, and reduces distribution costs. Separation of products into grades helps growers find the market that will give the largest return. To cooperative marketing associations, it provides a basis for pooling the products of various growers.

Farm products may pass through many hands on their way to wholesale markets. Commodity-exchange transactions, telegraphic sales and sales in transit, and trading where the buyer cannot personally inspect the products call for clear, definite grades. In futures trading, for example, the buyer cannot choose his particular seller; but he is protected when product quality is accurately certified. As the basis for Nationwide market reporting, standard grades facilitate comparison of market prices among localities, and between one year and another. Claims against carriers for losses in transit become easier to adjust when the commodity grade can be shown.

Under the U. S. Warehouse Act, licensed warehousemen must use official grades on the warehouse receipts if any grade is designated and if Federal standards have been established for the particular commodity stored. A major purpose of this act is to give producers freer use of warehouse receipts as collateral for loans. Such receipts enable the banker to judge the value of products offered as collateral; thus the producer has a quicker, surer way of obtaining needed credit.

Grading and Inspection Services

Grades especially adapted for retail or consumer use have been established for a number of farm products, and foods bearing the grade names are found to a varying extent in retail stores. Interest is mounting in graded foods and in the use of official grades; more and more consumers insist on such grades as a means of knowing what they are buying. This is especially true of eggs and canned goods, which the housewife cannot personally appraise. It applies to fresh beef, the judgment of which requires experience.

The usual evidence of official grading or inspection is a certificate issued by a Federal or federally licensed inspector. It is a written and signed certificate of grade (as for grain), a certification printed on or affixed to the container or wrapper (as for eggs and butter), or a direct imprint or stamping on the product (as for meat).

In setting up national standards, the Department studies the factors that may affect the economic value or desirability of a product. It defines definite quality groupings called grades with specifications or descriptions for each grade.

Before the Department formally recommends the grades, they are tested under actual commercial conditions. If the demand for grades is pressing, tentative grades based on the best information available may be issued; further study or trial will precede their promulgation as official standards.

One fundamental is that a national standard must recognize all the significant quality gradations of the entire supply of a commodity. This is necessary so that trading may take place in all qualities of the product.

Grades so defined recognize commercial distinctions. Usually, the highest grade represents the characteristics most sought after, the

qualities that bring the highest market prices; the lower grades reach down to include the inferior quality characteristics.

Some Characteristics of Official Grades

Generally, a grade in a set of standards specifies the lower quality limits that are permissible within that grade; but it may prescribe both lower and upper limits. The limits must avoid unnecessary technicalities, and must conform to some extent to trade practice. The extent to which a grade reflects the relative value of the product depends on how fully it deals with the various quality factors, on the range of quality permitted within one grade, and on the merchandising practices followed.

Besides being logical and scientific, national standards must also be practical. It might be possible to develop standards that would measure even minute variations in quality; but with a large number of grades for each product, such standards might be too cumbersome.

Generally, the characteristics that determine grade are the relatively simple ones—such as size, weight, and freedom from defects and decay. With some products, such as butter, color, flavor, and body are grade-determining factors. Such qualities, though sometimes difficult to measure precisely, must be defined sufficiently to fill ordinary commercial needs. Official standards may be changed from time to time to suit marketing conditions.

Equipment and Methods for Grading

New equipment and methods for grading purposes are being devised constantly. Modern devices include an electrical apparatus for quickly determining the moisture content of grain, and devices for determining grain dockage and test weights. An "electric eye" is being developed to measure the protein content of wheat and flour. Sensitive devices show the color of honey, hay, and cotton and aid in determining the quality of eggs. Pressure testers indicate the maturity of apples, pears, and other fruits. Hydrometers, refractometers, and other equipment used in grading certain processed products show the density, the sugar percentages, the relation of soluble solids to juice, and the cloudiness of liquor in canned foods.

Another group of marketing laws exists to prevent unfair practices. The Perishable Agricultural Commodities Act is an example. Among other things, this act makes it unlawful for any commission merchant, dealer, or broker to handle fresh fruits or fresh vegetables, whether frozen or packed in ice or (in the case of cherries) in brine, in either interstate or foreign commerce without a license from the Secretary. It authorizes proceedings to determine the fitness of an applicant to engage in such business and the denial of licenses to unfit persons. Injunction proceedings may stop the operations of anyone engaged in business without a valid license.

Marketing Agreements

Still another type of marketing legislation deals more specifically with marketing problems from the standpoint of income to producers. For example, the Agricultural Marketing Agreements Act of 1937

permits marketing agreements with processors, producers, associations of producers, and others who handle any agricultural commodity or its products. A marketing agreement may result from the voluntary action of producers and handlers; but such voluntary instruments are rare. Accordingly, under certain conditions, the statute provides for mandatory agreement. When two-thirds of the producers who produce two-thirds of the volume and handlers who handle not less than 50 percent of the volume express themselves by referendum in favor of an agreement, the Secretary issues an order to set it up. Should handlers of more than 50 percent refuse to concur, the Secretary of Agriculture may issue a mandatory order with the approval of the President. An exception is citrus fruit in California; in this case approval for 80 percent of the volume and 75 percent of the producers is required.

ECONOMIC AND STATISTICAL SERVICES

Economic and statistical work for the Department centers in the Bureau of Agricultural Economics, which obtains statistical information first-hand from the persons best qualified to furnish it; namely, farmers and processors of farm products. Nearly three-quarters of a million volunteers report on some item one or more times a year. These reporters include farmers, country merchants, dealers, processors, millers, elevator men, ginners, and local bankers. They furnish a steady stream of information on crop and livestock production, prices, stocks on hand, and trade.

Some 41 local field offices, each under the supervision of a statistician, prepare the statistics of each State. In the seasons of crop growth and harvesting, the Bureau's Crop Reporting Board tabulates the country-wide figures and makes monthly forecasts or estimates used subsequently the world over. The Kansas wheat grower, the Chicago grain merchant, and the importer in Liverpool or Bombay gage their business in some degree by the crop estimates.

Most of this production and price information is estimated on a State or regional basis; some of it on a county basis. Presented in charts, tables, and reports, it appears in forms useful to the public. It covers more than 100 crops and classes of livestock and livestock products, and reports supplies on farms and elsewhere, the utilization of farm products, prices received, and prices paid by farmers; also farm employment and wages. These estimates and reports are also the foundation material for public programs, such as the recommending of production goals, the apportionment of food and feed for domestic and foreign needs, and the establishment of ceiling and support prices.

Research by the Bureau in the field of marketing is being expanded. Specialized studies of markets for milk and butterfat and on the distribution of processed feed recently appeared. The area between farmers' prices and consumers' prices has long been under study and the research is continuing. Many recommendations by the Bureau for reducing the cost of marketing farm products have been put into trade practice or written into law. Various studies deal with technological changes in marketing and transportation. Current projects

cover air transportation of farm products, new types and uses of refrigerator cars, consumer packaging of fruits and vegetables, frozen foods, dried milk and eggs, citrus fruits, cotton, and industrial uses of fats and oils.

During the last year the BAE published the first detailed comparison between the long-time increase in gross agricultural production (including feed for work stock) and farm output for human use. It reported that farm output for human use, which should be distinguished from the food output, increased a fifth during the war, or nearly as much as from 1919 to 1939.

Various Periodic Reports

The Bureau issues periodic reports useful to persons who watch the land market. Land values have risen about 75 percent since before the war (1935–39). They are approaching the inflationary peak of 1920. War-induced changes in the relationships between landlords and tenants have necessitated research on leasing practices and rental rates. An allied study covers laws that affect inheritance, foreclosure and moratoria, property taxes, and homestead exemptions. Land use generally is coming under more careful scrutiny. The Bureau helps to examine farmer participation in conservation programs and the effects of conservation practices on crop yields. Studies of irrigation agriculture by the Bureau furnish information for irrigation developments.

The Bureau provides a detailed, authoritative picture of farm income. Cash receipts of American farmers, the survey shows, rose from a low of 4.7 billion dollars in 1932 to 21.5 billions in 1945. Estimates of receipts, by groups of products and by States, appear monthly in The Farm Income Situation. Such figures provide important comparisons within agriculture and between agriculture and other economic groups. Facts developed in this way assist the Treasury Department, legislators, manufacturers, mortgage lenders, and commercial banks.

Recent BAE publications cover the changing financial assets and equities of farmers, interest rates on farm mortgages and short-term credit, farm-credit policies and practices, agricultural insurance, and the effect of various taxation policies on agriculture. Notably these reports indicate that, in contrast to the sharp rise that occurred in mortgage debt during World War I, farmers during World War II reduced their mortgage debt. Between 1940 and 1946, it declined 23 percent, or from 6,586 million dollars to 5,081 millions.

Farm population decreased more than 5 million (17 percent) during the war. Births exceeded deaths by 2 million; but nearly 2 million farm people went into the armed forces; another 9 million moved off farms or ceased farming. Conversely, 4 million persons moved from town to farm. Studies by the Bureau of the composition and movement of farm population revealed these and many other useful population facts and showed some of the readjustments currently being made by veterans and war-industry workers. The Bureau gives considerable attention to the needs of veterans interested in farming, and has issued publications with regard to opportunities, problems, and farming possibilities.

Fall and Spring Outlook Reports

Outlook reports in fall and spring, and at certain other times, present facts on supply, price, demand, and other market factors, with the purpose primarily of assisting farmers in adjusting their production to probable market demand. This work, done in cooperation with the Extension Service and State agricultural colleges, reaches farm people through those agencies. Monthly "situation" reports note changing prospects for each important crop or class of livestock. Thus a wheat farmer, besides receiving periodically a comprehensive picture of the entire wheat outlook, gets also a monthly record of wheat prices and markets.

Special Work for Congress

Frequently, the Bureau does special work for Congressional Committees or other public agencies. Some assignments involve the preparation of numerous tables, charts, and reports. In this way the Pace Committee obtained data on postwar agricultural programs for the South. In addition the Bureau presented testimony at Committee hearings. Hearings developed the need for short-time, fact-finding programs for cotton. Members of the Bureau also cooperated with economists from Southern State experiment stations on problems of the Cotton South.

The House Agricultural Committee investigating marketing (Flannagan Committee) used BAE experts as technical advisers and consultants. They provided analytical material on marketing costs, market averages, and needed improvements in the Nation's distributive machinery. To the House Special Committee on Post-War Economic Policy and Planning, the Bureau presented material on employment, technological changes, and prices. Special services have been performed for the Senate Committee on the Missouri Valley Authority, the Food and Agriculture Organization, and the State Department, and for other public agencies.

Plans for Additional Statistical Work

In the near future the BAE will make additional estimates of livestock slaughter and will further improve or extend its estimates relating to dairy products, poultry, farm prices, farm wage rates, feed supplies, and feed consumption. Already through the Production and Marketing Administration, the Department makes monthly estimates of livestock slaughter and meat production in federally inspected plants. BAE plans now to obtain information on farm slaughter from crop and livestock reporters. It will also collect facts from nonfederally-inspected plants. Together, these reports will give the Nation a picture of total livestock slaughter and meat output, month by month.

The commercial broiler industry has expanded its volume ninefold since 1934. The Bureau will keep abreast statistically with this development. It will also collect more information on prices received by farmers for beef cattle, apples, milk, and poultry products. It will investigate amounts paid for hired labor, report on farm labor employ-

ment customs, and record wage rates in areas that employ large numbers of seasonal workers.

Six new statistical divisions have been set up within the Bureau under the general supervision of an Assistant Chief. They will report on: Field-crop statistics, fruit and vegetable statistics, livestock and poultry statistics, dairy statistics, agricultural price statistics, and special farm statistics.

FOUNDATIONS FOR REA AREA COVERAGE

With the close of the war and the lifting of wartime restrictions on construction of new electric-power lines, efforts have been redoubled to bring electric service to farmers and other rural people. These efforts have been stimulated on the one hand by an unprecedented demand for electric service on the part of rural people and retarded on the other by serious shortages of poles, transformers, wire, and other line-building materials.

In spite of these handicaps, however, thousands of rural families have received electric service in the months since the end of the war. Other thousands have been assured of service in the near future by the Rural Electrification Administration's approval of loans to finance construction of additional electric lines by rural electric cooperatives. Thus, the foundations have been laid and strengthened for extension of electric service to the majority of rural families in the United States on an area-coverage basis.

The increasing demand for electric service was reflected in the record volume of loan applications submitted to the Rural Electrification Administration throughout 1946 by rural electric cooperatives and other REA borrowers. In response to this demand, Congress authorized $300,000,000 of REA loans during the fiscal year ended June 30, 1946. With a lending authorization of $250,000,000 for the fiscal year ending June 30, 1947, it now appears that REA loans during the first 2 years after the war will total about as much as had been contemplated for a 3-year postwar program. They will exceed the total in the first 10 years of REA's existence.

Most of the applications for REA loans came from rural electric cooperatives and other REA borrowers preparing to expand their existing electric systems to serve additional rural consumers in their respective areas. There was also a substantial demand for service, however, in areas where no previous rural power systems existed. This was particularly true in North and South Dakota, Nebraska, and other sections of the Great Plains States.

During the fiscal year, REA approved loans totaling $290,463,910 from 1946 funds (table 3). Estimates indicate that these loans will be sufficient to build a total of 183,916 miles of line serving 565,247 rural consumers in 45 States and Alaska. The following table shows the total loans approved from 1946 funds for borrowers in each State, the number of miles of line to be financed by these loans, the number of consumers to be served, and the total amount of REA loans approved for each State from the inception of the REA program to June 30, 1946.

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TABLE 3.—*REA loans approved 1946, lines to be built, and consumers to be served; total loans, 1935–46*

State	Total loans approved from funds available in fiscal year 1946	Miles of line to be constructed from 1946 loan funds	Consumers to be connected as result of 1946 loans	Total REA loan approvals, 1935 to June 30, 1946
Alabama	$9, 786, 000	7, 221	29, 697	$25, 159, 649
Arizona	658, 000	322	1, 359	1, 984, 000
Arkansas	7, 817, 094	5, 235	18, 062	21, 421, 594
California	345, 000	251	679	2, 414, 500
Colorado	4, 101, 441	2, 326	5, 297	16, 044, 551
Connecticut				
Delaware	263, 000	138	374	1, 376, 000
Florida	6, 389, 500	3, 443	10, 829	11, 359, 000
Georgia	12, 032, 560	8, 615	30, 009	36, 975, 402
Idaho	1, 732, 736	1, 283	3, 443	5, 995, 750
Illinois	9, 768, 000	5, 817	18, 125	32, 792, 803
Indiana	7, 312, 000	4, 370	16, 884	30, 230, 564
Iowa	16, 476, 188	8, 477	21, 383	44, 647, 698
Kansas	12, 556, 700	9, 063	17, 324	23, 663, 751
Kentucky	9, 155, 000	5, 677	22, 756	26, 618, 855
Louisiana	5, 976, 500	4, 046	13, 886	17, 270, 600
Maine	250, 000	154	543	1, 012, 500
Maryland	1, 770, 000	880	3, 012	5, 018, 500
Massachusetts				
Michigan	3, 647, 000	1, 438	4, 910	17, 514, 500
Minnesota	15, 255, 360	8, 891	26, 216	48, 525, 301
Mississippi	11, 549, 000	8, 768	34, 481	26, 622, 953
Missouri	14, 450, 843	10, 710	31, 211	44, 233, 325
Montana	7, 653, 066	4, 136	9, 428	11, 984, 598
Nebraska	10, 507, 000	7, 594	15, 902	24, 522, 663
Nevada	37, 000	15	14	296, 000
New Hampshire	120, 000	49	430	1, 794, 000
New Jersey	100, 000	100	500	668, 500
New Mexico	2, 308, 000	1, 271	3, 405	4, 781, 500
New York	200, 000	175	950	4, 548, 618
North Carolina	12, 013, 976	7, 363	28, 520	32, 000, 352
North Dakota	11, 843, 434	8, 071	12, 205	17, 054, 972
Ohio	3, 044, 000	1, 600	5, 488	28, 663, 301
Oklahoma	10, 018, 000	6, 878	17, 896	24, 581, 506
Oregon	2, 625, 000	1, 400	2, 145	8, 539, 584
Pennsylvania	2, 302, 000	1, 533	5, 301	14, 817, 200
Rhode Island				
South Carolina	6, 269, 020	4, 372	16, 451	16, 539, 269
South Dakota	7, 229, 000	6, 180	10, 814	10, 930, 154
Tennessee	11, 123, 000	8, 302	46, 604	25, 686, 608
Texas	23, 685, 400	14, 595	34, 698	67, 319, 074
Utah	402, 564	108	266	1, 702, 000
Vermont	564, 976	397	1, 443	1, 905, 000
Virginia	6, 840, 000	3, 946	14, 648	18, 123, 356
Washington	3, 533, 000	2, 034	3, 717	11, 996, 611
West Virginia	75, 000	35	366	802, 000
Wisconsin	15, 850, 010	5, 527	21, 839	40, 462, 822
Wyoming	1, 566, 000	1, 325	2, 100	5, 723, 000
Alaska	10, 000			488, 000
Virgin Islands				275, 000
Total	290, 463, 910	183, 916	565, 247	817, 086, 990

Bottlenecks in Materials

To speed the task of converting these and previously allocated loan funds to operating electric systems, it was necessary for REA to

break serious bottlenecks in the supply of line-building materials and to assist its borrowers in securing these materials promptly and at reasonable prices.

An outstanding example of REA's efforts in this direction is its success in relieving the severe shortage of poles which virtually halted construction of new electric lines 6 months after VJ-day. Working with the Forest Service of the Department of Agriculture and with pole suppliers, however, REA succeeded in locating and tapping extensive new sources of pole supply and in encouraging establishment of additional plants for treating. Pole treating was also speeded up by slightly modifying pole requirements to permit use of pentachlorophenol where creosote was not available.

To combat still further delays due to shortages of materials, REA revised its recommended contract procedure to permit REA-financed cooperatives and other borrowers to purchase the necessary line-building materials and enter into contracts for construction labor only. Under this procedure, it was believed that the cooperatives would be able to build up their stock piles of materials so that contractors could proceed with construction with fewer shut-downs to wait for materials.

The success of these and other similar measures is indicated by the fact that, despite shortages, delays in delivery and other obstructions, REA borrowers built 50,000 miles of power lines in the fiscal year 1946. As a result, approximately 230,000 farms and other rural consumers were connected to REA lines during the fiscal year to receive central-station electric service for the first time. An additional 30,000 consumers who were already receiving service also became REA-served consumers during the year. About 15,000 of these were receiving service from lines originally financed by the Tennessee Valley Authority. The indebtedness for the facilities serving them was transferred to REA in a refinancing program authorized by Congress in enactment of the McCord Amendment to the Rural Electrification Act. The other 15,000 consumers were receiving services from lines purchased by REA borrowers in order to facilitate area-coverage electrification in their respective territories. The year's total increase of 260,000 in the number of consumers served by facilities financed by REA loans was the second largest 1-year expansion in REA history. During the last 6 months of the fiscal year REA borrowers were connecting well in excess of 20,000 consumers a month.

Combating Rising Costs

Throughout the year it has been necessary for REA to make a special effort to combat rising costs of line construction. The success of these efforts has been particularly important because the extent to which rural people in the more remote areas can be served by self-liquidating, REA-financed lines depends largely on construction of low-cost rural electric systems.

At the outset of the rural electrification program, REA engineers reduced the cost of building rural electric lines by more than half. Since the war, in the face of rising labor and materials prices REA has made a sustained effort to prevent excessive rises in costs by withholding approval of high-cost contracts. This has been so effective that in nearly every case, such contracts were relet at substantially lower figures.

More recently REA has advised its borrowers to insist on the privilege of cancelling orders for materials subject to price rises before delivery and has announced that it will withhold approval of purchases at prices which threaten to affect the feasibility of its loans.

While postwar construction of new electric lines has been getting underway, the rural electrification program has been more closely coordinated with the over-all program of the Department of Agriculture. This has been made possible by transfer of REA from its wartime headquarters in St. Louis to the South Agriculture Building in Washington. Thus for the first time since REA became a part of the Department in 1939, it has been possible to integrate the work of REA with that of other agencies and bureaus dealing with the various phases of agriculture.

Cooperation With REA Borrowers

REA itself has continued to work with its borrowers, with rural people and with other Government agencies to give assistance in such matters as planning proper wiring, the selection, care and use of electric equipment, installation of electric farm water systems and the safe use of electric equipment. REA engineers have also continued research in design, construction, and efficient operation of rural electric systems.

In addition to measures dealing with the problems of building and extending rural electric systems and employing electricity on the farms already electrified, steps have been taken by REA to meet many of the long-range problems which must be solved before electricity can become a significant factor on the majority of farms in the United States.

On the basis of electrified farms, the Nation is now at the approximate halfway mark in rural electrification. As might be expected, many of the farms and rural homes still without electric service are in the more thinly settled sections and away from the lines of existing rural electric systems. Many of these farms, however, can be served by self-liquidating lines laid out to reach virtually every consumer on an area-coverage basis.

REA is encouraging its cooperative borrowers—of which there were 912 on June 30, 1946, to undertake this responsibility in the areas in which they operate. To assure soundly planned and orderly extension of electric service in these areas, it has recommended that surveys be made to establish the boundaries of the area which each cooperative can expect to serve efficiently and economically. Such tentative boundaries are of course a necessary step in sound planning of rural electric systems.

As a second step, REA is urging its borrowers to have competent engineers make surveys to determine the kind of system which they will ultimately need to provide adequate service within their respective areas. Such ultimate-system studies can now be made on the basis of past experience and should assure development of electric systems properly designed to meet the needs of the rural community, not only in the immediate future but at the end of 25 or 50 years.

It is significant that the nonprofit, locally owned and operated cooperative has been the most effective instrument in bringing the rural electrification program to the halfway point. This group represents more than 92 percent of all REA borrowers and has received in excess of 95 percent of all loans approved. With the remaining portion of

the rural electrification job located in the more sparsely settled rural sections, the cooperative plan is regarded as the only type of operation capable of completing it.

Continued progress in rural electrification therefore demands that the individual cooperative be kept strong and vigorous through the continued interest of its members who have the responsibility for shaping its policies and controlling its management. The fact that REA-financed cooperatives borrow all of their initial capital from the Government—except what they obtained directly from the pockets of their members—has had the effect of obscuring the direct financial interest of the members in their cooperative enterprises. REA is therefore recommending that cooperatives incorporate a capital-credits plan into their accounting system. This will enable the cooperatives to credit each consumer with his share of the capital contributed during any year in which income exceeds the cost of operation. Capital in such years will be apportioned among the consumers on a patronage basis.

Financial Condition of REA Cooperatives

The financial condition of rural electric cooperatives and other REA borrowers through 1946 continued to reflect sound planning, efficient operation, and increasing use of electricity in rural areas. Payments on interest and principal continued to run approximately $20,000,000 in advance of repayment schedules with less than 1 percent of the amount due as much as 30 days delinquent.

The sound financial condition of these rural electric systems was further emphasized by the fact that REA during the year was able to recommend that a number of the older cooperatives reduce rates for electric service to their consumers. These recommendations were made in specific instances after special studies indicated that such reductions would not impair the security of the Federal funds invested nor the borrowers' ability to extend lines to people within their service area who are still without power.

Through these measures, the Rural Electrification Administration continued to strive toward dependable electric service at lower cost for larger numbers of rural people.

RESEARCH REQUIREMENTS AND FACILITIES

The first year of peace has been eventful in agricultural research. Hybrid vigor has been demonstrated in livestock, new concepts in plant breeding have taken shape, new ideas in insect control have given promising results. Motor fuels from waste farm products have moved closer toward realization, and many other interesting products have come from our chemical laboratories.

There has never been a better time for agricultural research than the present. One of the few constructive results of war is the stimulation it gives to thought and imagination. Advances made along many frontiers of science during the war have challenged research workers to accomplish equal results for peace, and to put new ideas and new techniques boldly into practice.

Public confidence in research has never been greater. Many people who once thought of scientists as rather impractical now regard them

as the most practical of people. Confidence and respect for the scientific approach crystallized during the year into new legislation. Without a dissenting vote in either house of Congress, the Research and Marketing Service Act of 1946 was passed.

This act authorizes additional expenditures for research on an increasing scale for the next five years. By that time—if the authorized increases are granted—the investments in research by the Department will be double those at present. The amount of Federal funds going to the States for similar work will be almost four times as great as in recent years.

The favorable outlook for research, however, is clouded by the lack of trained personnel. During the war we drafted the boys who were preparing themselves for careers in research. Many of them are now back in colleges and universities, but they are not ready to begin their life work. Preparation for research is a long and tedious task. It extends for at least 5 to 6 years beyond high school. We are still drafting boys from technical and scientific college courses, although more consideration is now being given to such students.

In his report to the President on a program for postwar scientific research, Dr. Vannevar Bush, wartime director of the Office of Scientific Research and Development, stated: "Among the young men and women qualified to take up scientific work, since 1940 there have been few students over 18, except some in medicine and engineering in Army and Navy programs and a few 4–F's, who have followed an integrated scientific course of studies. Neither our allies nor, so far as we know, our enemies have done anything so radical as thus to suspend almost completely their educational activities in scientific pursuits during the war period."

Uninterrupted training of young men and women who have demonstrated interest and ability in the field of science is important. The finest equipment and the most elaborate support of research will not make up for the lack of well-trained people. It is generally agreed that the limiting factor in scientific development is human. We must not overlook this factor.

The time in which we live calls for the fullest use of scientific knowledge. It is our greatest bulwark against obsolescense and disaster. We cannot afford to neglect science.

Greatly broadened agricultural research is authorized under Public Law 733 (the Research and Marketing Act of 1946), which was signed by the President August 14. No funds have been appropriated as yet; but a total of $9,500,000 is authorized to be appropriated in the fiscal year 1947 for agricultural research and marketing services, with special emphasis on research regarding the utilization of farm products, the marketing and transportation of farm products, and agricultural production. Additional amounts are authorized for subsequent years. Principal objective of the legislation, as stated by its authors and sponsors, is to give agriculture parity with industry in the field of research.

The legislation specially emphasizes research and services to improve the marketing, handling, storage, processing, transportation, and distribution of agricultural products. An appropriation of $2,500,000 is authorized to be made for 1947 to conduct the newly authorized research and service. Authorized annual increases would

raise this amount to $20,000,000 in 1951. These authorized funds are in addition to all other funds available for marketing activities.

Establishment of a National Advisory Committee of 11 members, 6 of whom are to be producer representatives, is provided for in the new measure. This Committee, to be named by the Secretary, will make recommendations regarding the research and service work and assist in obtaining the cooperation of affected groups and Federal and State agencies. The law provides that the whole Committee shall meet at least once each quarter.

Scope of the Broadened Research Program

Basic agricultural research, now carried out under various grants by Congress, is greatly expanded by the terms of the new measure. Title I broadens the authority of the Bankhead-Jones Act of 1935 and provides for payments to the States for additional research on all types of farm problems, particularly those of recent origin and any that may develop later. Permitted fields of research include improved methods of production, problems of human nutrition, discovery of new and useful crops, expanded uses for farm products, conservation and development of land, forest, and water resources for agricultural purposes.

The act permits the Secretary of Agriculture to contract for the services of public or private organizations in carrying out utilization research, if this would promise more effective or economical results. Utilization research is to be conducted so far as practicable in the Department's laboratories. An initial appropriation of $3,000,000 is authorized to be made for 1947; the annual appropriation will rise to $15,000,000 in 1951.

A major share of the expanded research work will be done by State agricultural experiment stations, as provided in the Bankhead-Jones Act. The new measure gives a formula for dividing the annual appropriation among the States, Territories, and Puerto Rico. This provides for an equal allotment of 20 percent of the funds to each State and Territory and Puerto Rico and additional allotments on the basis of rural and farm population ratios and the need for research on regional problems. The initial appropriation of $2,500,000 will be increased annually until it totals $20,000,000 by the fifth year. A fifth of the funds allocated to the States must be earmarked for research in marketing.

A separate item of $1,500,000 in 1947 is authorized for cooperative agricultural research conducted by the Department of Agriculture and State agricultural experiment stations and other appropriate agencies. This will be increased by $1,500,000 annually until it totals $6,000,000. The bill requires precautions against duplication of work and calls for a complete statement of the research being done under contract or cooperative agreements to be included in the Department's annual report.

Research Into Marketing Facilities and Costs

Title II of the legislation provides funds and authority to expand research and service in the marketing, transportation, and distribution of agricultural commodities. In this field, too, the Secretary of Agriculture may contract with outside agencies for research services.

Authorization is also given for making allotments of funds to State departments of agriculture, State bureaus and departments of markets, State agricultural experiment stations, and other agencies for cooperative research projects. It is specifically required that the cooperating agencies match Federal funds with special appropriations.

The measure authorizes annual appropriations to be made for specific purposes as follows:

1. Payments to States and Territories for research (as a condition for receiving 72 percent of the funds for this type of research, States must match the Federal funds with State appropriations):

1947	$2,500,000	1950	$15,000,000
1948	5,000,000	1951	20,000,000
1949	10,000,000		

2. For use by the Department for utilization research:

1947	$3,000,000	1950	$12,000,000
1948	6,000,000	1951	15,000,000
1949	9,000,000		

3. For use by the Department in cooperation with States (for other than utilization research):

1947	$1,500,000	1949	$4,500,000
1948	3,000,000	1950	6,000,000

4. For marketing research and services:

1947	$2,500,000	1950	$15,000,000
1948	5,000,000	1951	20,000,000
1949	10,000,000		

FOODS AND TEXTILES FROM CONSUMER'S STANDPOINT

In the past few months comparisons of food consumption levels in the United States with those in other countries have been widely publicized. These comparisons, however, do not enable us easily to imagine how it would feel to have only half to a third as much food as we are accustomed to eating. Millions of people in Europe and in other war-torn countries have had this experience in the last year or so. In some countries, especially in the Far East, being underfed is such an old story that it seldom makes news. Scientific studies help out the lesson of the statistics.

The effects of underfeeding on nutrition depend on how low the level is and how long it lasts. One of the first results, and one of the most easily measured, is loss of weight in adults and retarded growth in children. Accordingly, the United States Army instituted monthly weighings of over 100,000 persons in occupied Germany and Austria as one check on the sufficiency of food supplies from time to time. These weight studies have been supplemented by more detailed measurements on a smaller sample to determine the extent of nutritional deficiencies.

Investigations in these areas and elsewhere show that when food supplies provide fewer than 2,000 calories per day per person for any length of time, the results are serious. Children fail to grow normally; adults lose weight and do not work effectively; civil unrest appears. Severe vitamin deficiencies were not found commonly, probably be-

cause of lowered rates of metabolism associated with reduced caloric intake. However, observers reported unmistakable signs of rickets among groups of young children who had not had fish liver oil or other source of vitamin D. Secondary observed effects of underfeeding were greater susceptibility to disease and higher death rates. The extent of the permanent damage to tomorrow's men and women could not be estimated.

As shown previously in this report, the United States has shipped enormous quantities of food to alleviate these serious food shortages. Grain products, fats, and other foods exported in the year July 1945 to July 1946 were sufficient in quantity to provide an additional 500 calories a day for 1 year for 250 million people. Measured in another way, these shipments would have provided nearly a third of the calories needed for 1 year by the population of the United States. This is no drop in the bucket; but the job was not finished. Food shortages will be critical in many parts of the world for at least another year and large additional supplies of food from this country will be needed.

What does this huge food-export program mean for American nutrition? It does not mean any deficiency. In terms of total food supplies about 8 percent will be exported in 1946, as compared with 6 percent in 1945. These percentages do not include overseas shipments to our forces. Less food will be needed this year for the armed forces and for civilian feeding abroad by the Army. Civilian consumers in the United States will consequently have a larger proportion of the total food supply than they had in 1945.

Calorie Value of Food Supply

The calorie value of the national food supply for 1946 as a whole is expected to average about 3,300 per person per day, only slightly less than in 1945. Even with a lower consumption of wheat products for part of the year, the average supplies of essential nutrients (except calories) will probably exceed prewar quantities with considerable margin. These, however are over-all estimates for the year as a whole; they do not tell about the uneven distribution from season to season, from place to place, and from family to family.

For example, during April, May, and June the amount of flour milled for civilian consumption was one-third less than the quarterly average in 1945. This meant a real shortage for the time being. The famine Emergency Committee urged consumers to reduce their consumption of wheat products and to waste none. Some people did nothing, except when the scarcity of bread in the market temporarily limited their consumption. But it is believed the majority made a conscious effort to use less bread and flour. How this modification affected their diets would depend on the amount of the reduction and on the choice of substitutes.

A cut of 25 percent from the purchase of wheat products by city families in September 1944 would have reduced the calories by about 200 per person per day.

Our Diet Abundant and Varied

Our bumper crops of wheat and corn suggest that the United States can meet its commitments abroad. Little if any modification of our

food consumption may be necessary for the remainder of 1946 and early 1947. Even if a significant modification were necessary, our national diet would probably not suffer nutritionally. There is room for further reduction in waste, with no reduction in the actual intake of food. In no other country are food supplies as abundant and varied. Many different combinations of food can provide an adequate diet. A slight shift in the proportions of foods available might involve minor adjustments in meals but need not impair their nutritional quality.

But this assumes alertness among homemakers as to the food needs of their families, and ability to make wise adjustments when the need arises. During the war years higher incomes and relatively stable prices enabled many families to buy larger quantities of milk, eggs, meat, fruit, and vegetables than they had been able to have before the war. As a result of this and of the enrichment of grain products the calcium, iron, and vitamin values of the national diet have been at unprecedented high levels..

For those who must buy more of the lower-priced foods, grain products, dry beans and peas, and potatoes are excellent foods and make valuable contributions to the diet. They need to be supplemented, however, with minimum quantities of milk, eggs, meat, fruit, and vegetables, which supply high-quality protein, calcium, riboflavin, niacin, and vitamins A and C.

If a high level of national nutrition is to be maintained, consideration must be given to means of securing more equitable distribution of food among all groups in the population.

Vegetable Proteins

Laboratory studies by the Bureau of Human Nutrition and Home Economics showed conclusively that proteins of soybeans, peanuts, cottonseed, wheat germ, and corn germ have nutritive value so high that they may be counted on to "extend" or "spare" the proteins of meat, milk, eggs, and other animal foods in times of short supply. A very practical way to use these plant proteins to advantage, the studies showed, is to team them with abundant breadstuffs and cereals. Strangely, such combinations sometimes prove actually more nourishing than the components would suggest. Example: In feeding experiments with young rats, adding 15 parts of soybean flour to 85 parts of wheat flour in bread increased its growth-promoting values fivefold. Among these plant proteins chosen for investigation, wheat and corn germ proved definitely superior, the wheat germ in turn being higher than the corn germ in its nutritive value for promoting growth. Wheat germ thus appears to be the plant protein food that comes nearest to the proteins of meat, eggs, and milk in biological value.

Determination of Vitamin A Requirements

To find out the vitamin A requirements of human beings, research workers in the food and nutrition laboratories of the BHNHE fed an experimental diet to volunteer adults. Especially prepared meals contained every nutrient that the human body is known to need except vitamin A, which was almost completely absent. Since one early measurable effect of the lack of vitamin A is night blindness—failure of the eyes to adapt normally to dim light—appearance of this condi-

tion was taken as a sign that a subject's body had used up most of its stored vitamin A. Measured amounts of vitamin A were then given in gradually increased doses until the subject received just enough vitamin A to keep vision normal in dim light.

In the first experiments, solution of standardized cod-liver oil and pure carotene provided the measured amounts of vitamin A. Later, the minimum requirements were measured in term of natural food, using peas, spinach, and carrots as sources of carotenes, which are changed into vitamin A in the body. It was found that the body needs about 30 to 60 percent more carotene as found in vegetable foods than it does of vitamin A found in animal foods. This finding had special timeliness for the war period when restricted food supplies caused civilians to lean more heavily upon plant foods for vitamin A. Data for estimating daily minimum vitamin A requirements of the average normal adult have come from these experiments. The data were included in the informational background used when the Committee on Food and Nutrition of the National Research Council set forth recommended daily allowances of vitamins and other nutrients as a nutrition yardstick for America.

Tables of Food Composition

A new aid for nutritionists and others engaged in planning diets or calculating the nutritive value of food supplies is the publication, Tables of Food Composition in Terms of Eleven Nutrients, Miscellaneous Publication 572, issued by this Department. The tables, which bring under one cover the composition of 275 common foods in terms of 11 nutrients, were prepared by the BHNHE and the Committee on Food Composition of the National Research Council's Food and Nutrition Board. Previous publications by the Bureau on the proximate composition of foods dealt with a more limited number of the important nutrients.

The new publication gives average values for food energy, protein, fat, carbohydrate, vitamin A value, thiamine, riboflavin, niacin, ascorbic acid, water, and refuse. The values given are derived from all available literature of nutrition research and from unpublished data from laboratories that have analyzed foods through arrangements with the National Research Council. In addition to foods believed to be most commonly used in the United States, the tables include as many of the less common foods as present data warrant. All the values are stated in terms of 100-gram edible portion, and in terms of 1 pound as brought into the house for consumption.

Savings to Clothing Industries

Major savings to the clothing industry and to consumers alike are beginning to result from the BHNHE's work on measuring women and children as a basis for sizing clothing. Lack of scientific data on the body measurements needed in sizing garments is at the root of the chaotic condition which has always existed in the sizing of clothing—particularly for women and children. Department stores complained of a $10,000,000 headache each year from returns and exchanges "because of wrong size." Mothers complained of wasting time, money,

and energy buying clothes that failed to fit children at home. Age of a child was no dependable guide to clothes size.

With the cooperation of 20 colleges and universities, and with funds furnished by the Government, scientists weighed and measured nearly 150,000 boys and girls. Thirty-six clothing-construction measurements were taken on these boys and girls, who ranged from 4 to 17 years of age and represented 16 states. From data obtained, the Bureau recommended a two-way method of sizing children's clothes based on height and girth at hip.

The height-hip system is very similar to the system by which men have bought their shirts and other garments for years—according to a few guide dimensions. The Bureau's scientists continued by measuring 15,000 women from 18 years old to 80. Fifth-eight measurements used in constructing patterns and garments were recorded, and weight was taken as a further check on bodily proportions. Universities and other institutions in representative sections of the country cooperated.

From the data, the Bureau recommended height and weight combined, rather than the customary bust measure, for predicting fit of full-length garments. For garments for the upper part of the body, height and bust combined offered the best guides to a fit. For lower trunk garments, height and hip girths are good guides. No single measurement is adequate as a basis for sizing garments and patterns, the survey conclusively showed.

As a result of these measurement studies, some pattern companies and clothing manufacturers are now making use of the new sizing system for children's garments. On the basis of the Bureau's work, new standards for body sizes for boys' garments have been adopted by the American Standards Association, which serves as a link between scientists and the trade. While awaiting developments in the women's wear field, one large mail-order house has already gone ahead with using the Bureau's data and the recommended sizing methods for sizing its women's garments.

Cotton-Hosiery Investigations

Directed by Congress to investigate cotton hosiery as a possible outlet for more American-grown cotton, the BHNHE began in 1939 to make laboratory and service tests. Accomplishments of this research proved of timely value in the wartime clothing situation. When the silk crisis came, the Bureau was able to make available to the trade over 200 designs for women's full-fashioned cotton hose. These included sheer, medium, and heavy weights in plain and fancy weave for street, work, and dress wear. Some of these designs were reproduced exactly in marketed hose, and all of the designs furnished manufacturers with ideas for developing their own exclusive designs.

Other phases of this research provided information on yarns, finishes, and hosiery construction at a time when this was especially needed. These studies also showed how medium staple lengths of cotton fiber can be used acceptably in hosiery manufacture. Wearing qualities were determined by actually putting into service hose made of different varieties of cotton and with different yarn and fabric constructions. These studies have had an important influence on making

cotton hosiery once again an accepted article in the well-dressed woman's wardrobe. They have shown cotton growers and hosiery manufacturers the possibilities of American-grown cotton in high-grade hosiery manufacture. And they have contributed important methodology to the scientific study of a standard article of clothing.

International Food-Consumption Studies

Studies of the food-consumption levels of the United States, Canada, and the United Kingdom, first made on a comparative basis for the year 1943, were extended through 1945. The results show that in 1945, as in 1943, the United States, Canada, and the United Kingdom each possessed reasonably adequate supplies of food to meet nutritional requirements for their populations. Total supplies of foodstuffs in terms of calories varied only slightly from prewar levels.

Important shifts in types of food available for consumption were found in all three countries, which made distribution difficult, created great hardship in the preparation of meals, and in some cases necessitated rather radical changes in personal eating habits. Meat rations, for example, were reduced in the United Kingdom during 1945 until the supply moving into civilian consumption was 21 percent below the prewar average, while beef supplies in the United States were 15 percent below the prewar average during the first 6 months of 1945. Total protein supplies available in 1945 for domestic consumption in the United States, however, were 14 percent and in Canada 9 percent above the prewar level. British protein levels were 10 percent above those of prewar years but were made up of vegetable proteins to a much greater extent than in the United States or Canada.

There were other notable differences in 1945 diets as compared with those of prewar years. Supplies of sugar were down 18 percent in the United States, 24 percent in Canada, and 32 percent in the United Kingdom. The decline in fats and oils was also great, amounting to 11 percent in the United States, 10 percent in Canada, and 20 percent in the United Kingdom. Supplies of milk and milk products, excluding butter, were up 30 percent from those of prewar years in the United States, up 21 percent in Canada, and up 30 percent in the United Kingdom. Potato consumption did not fluctuate greatly during the war years in either the United States or Canada, but in the United Kingdom averaged 60 percent above the prewar level for the whole year 1945 despite a temporary shortage during the spring of the year.

The Department of Agriculture has also deemed it necesary in view of wartime exigencies and postwar shortages to participate in the making of food-supply estimates in countries other than the United States, Canada, and the United Kingdom. Representatives of the Department served on Inter-Allied committees in both 1944 and 1945. They assisted in preparation of food balance sheets for the allied countries of continental Europe and estimates of food supplies available in enemy countries.

Estimates have been made by the Department of Agriculture during recent years of indigenous production and the total available supplies of foodstuffs in all the countries for which adequate statistics for

measuring consumption were available. Data gathered in 1946 by the Department from all over the world were made available to the Food and Agriculture Organization and to the United States representatives on the International Emergency Food Council, enabling them to compare relative needs for various foods on a scientific basis. Australia has also made an analysis of the food levels in that country, using the same method as that employed in the original United States-Canada-United Kingdom nutrition studies.

International food-consumption comparisons are valuable for the future in that they promote improvement not only of statistics, but also of nutrition and markets for agricultural products among nations generally. In response to a request of the Food and Agricultue Organization, members of the United States Department of Agriculture and other agencies outlined suggestions for a food-consumption statistical program. The FAO has adopted the principle that the improvement of nutritional levels and fulfilment of other objectives as provided in the constitution of the FAO will require national food-consumption-statistics programs and international collaboration in the field of food consumption statistics.

DEVELOPMENTS IN PLANT SCIENCE

Research in the Bureau of Plant Industry, Soils, and Agricultural Engineering on ways and means of reducing hazards in the growing of cereals has made the production of some of these crops more complex but has greatly increased yields and improved quality. Each year sees further gains that still manage to look important in spite of the overpowering record of hybrid corn, which has made possible a better than 3-billion-bushel crop each year for five successive years. Golden Cross Bantam sweet corn, a hybrid released 13 years ago by the Department and the Indiana station and now the most widely grown canning corn, has been further improved. The new one, Improved Golden Cross Bantam, is a better yielder, has fewer tillers, has ears similar to the original but higher up on the stalk and with a few more rows of kernels.

A summing-up on the value of new wheat varieties distributed since World War I shows they have added more than half a billion bushels to the Nation's bread material during the last 4 years, much of it in the hard spring wheat region, where stem rust has been very destructive. The newest wheat of this class, Cadet, distributed in 1946, resists stem and leaf rust and outyields other beardless varieties. There has been marked progress in developing new varieties for the hard red winter wheat region where drought resistance is of primary importance. Establishment of the new Austin wheat in central and south Texas is reported by the cereal specialists as the first step in a program to eliminate the source of stem rust spores that have been carried by the wind each year with disastrous results in the great wheat areas to the North. The Austin variety, put out in cooperation with the Texas station in 1943, proved so popular that 600,000 acres of it was harvested this year, a good crop itself and a great rust barrier.

Oats have been advancing in productiveness along with corn and wheat, and because of this are holding an important place as a feed

grain even though their principal outlet, as feed for horses, has been greatly reduced. In the past decade new varieties have taken over the important oats area of the North Central States. Still better varieties are pushing the preceding good varieties into the background. The two newest, Clinton and Benton, increased on selected farms for the past 2 years, will provide 1 to 2 million bushels for seed in 1947. These varieties, developed with the Iowa and Indiana stations, respectively, are resistant to a number of diseases, are excellent yielders even in comparison with the varieties that became popular within 6 or 8 years, and have such stiff straw that they are almost ideal for combine harvesting.

Other advances brought about through research on various cereal crops include the release of a superior new variety of barley called Bay, produced in cooperation with the Michigan Agricultural Experiment Station; quick-maturing grain sorghums for parts of the Southwest which enable farmers to produce a crop even when drought makes late planting necessary; short-stalked sorghum varieties with kafirlike heads for the more humid eastern strip of the Great Plains; spread of improved rice varieties until last year they produced 65 percent of the southern crop on 63 percent of the acreage; and spread of six new seed-flax varieties since 1942 to occupy about half the acreage of the region, giving promise of the ultimate complete control of the destructive rust disease.

Sugar-Plant Investigations

Sugar-plant investigations have resulted in outstanding recent improvements in sugarcane, and in sugar beets for the West and for the humid beet-growing areas. Two new sugarcane varieties for Louisiana and Florida are both adapted to machine harvesting and have many other advantages, including resistance to certain diseases. Another advantage to sugarcane growers, particularly in Louisiana, is the discovery that 2,4–D is effective in killing alligator weed and "tie-vine" and has no adverse effect on the cane plants. Johnson grass, the other big weed pest in canefields, is not much damaged by this treatment but tests show it can be controlled with repeated flamings.

Sugar-beet growers may now look forward to the day, probably not far off, when their crop yields will show the lift of hybrid vigor. It has already been introduced, but strains are not yet available for commercial use. To be a success such strains must have the seed-producing convenience of one parent line that is male-sterile. The plant breeders already know they have available in their breeding material all the characters needed to provide the hybrids wanted. What might be called the onion trick (from the success of the California Hybrid Red Onion, based on male sterility, and mentioned in last year's report), will be worked again for the sugar-beet farmers. The experimental hybrids already worked out have shown high disease resistance. They can outyield good commercials by 2 tons of beets and 11 percent sugar.

Research has developed more improved varieties for the dry western and the humid areas farther east and has given new impetus to mechanizing the crop by showing that the decisive factor in yields is the number per acre of 1- and 2-plant hills and not simply the number of plants per acre. This fact is important in the mounting mechanization of the crop from planting, through thinning and cultivation, to digging

and loading. The leading sugar-beet variety in the humid area, the hybrid U. S. 215 × 216, is about to be replaced as breeders have been improving the parent varieties and getting better hybrids. The chain of improvement has resulted in renaming the original U. S. 215 × 216/1, the next improvement U. S. 215 × 216/2, and a new one that is highly resistant of leaf spot and high in sugar, U. S. 215 × 216/3.

Furthermore, two stages of improvement have been made in the sugar-beet variety U. S. 22, now grown on more acres in the West than any other. The new ones are U. S. 22/2 and U. S. 22/3. They yield about alike if exposure to curly top disease is light, but when the disease is heavy the U. S. 22/3 yields about 2 tons more an acre than U. S. 22/2.

Better Rubber Yielders

In efforts to strengthen rubber production in the Western Hemisphere, where the basis of the rubber plantations of the East Indies originated, Department and Latin American rubber-plant specialists have been searching out high-yielding hevea trees in the upper Amazon Valley. They have collected budwood from superior yielding wild trees in Colombia, Peru, and Brazil which is expected eventually to provide the basis for high-yielding disease-resistant plantations, better than those now found in the principal rubber-growing areas of the world. On the other hand, guayule hybrids of superior latex-yielding capacity are developing as a result of studies of the reproductive behavior of this native American plant. Also our plant breeders have developed an improved synthetic variety of the Russian rubber-yielding plan kok-saghyz by isolating good parental types that are expected to produce plants of larger root size and higher rubber content.

Fruit and Vegetable Additions

Research on the production and handling of fruits, vegetables, and ornamentals takes on more and more complexity with the years. In addition to the announcement of new varieties released this year, of which there are about a dozen, there have been improvements in the use of plant-growth-regulating substances, advances in disease control, improvements in the technique of plant breeding and in production management, research on the effects on the crop from accumulations in the soil of the new insecticide DDT, and improvements in packing, storing, and transporting these highly perishable crops.

Some of the new varieties that have been started on the way, through seedsmen and nurserymen, to the farmers and other producers and home gardeners are a new peach which is a good shipping variety adapted to the southern edge of the peach belt in the East; the Suwannee strawberry (for home gardens in the South); two new disease-resistant Pinto beans (being increased in cooperation with the Colorado Agricultural Experiment Station) resistant to most of the known forms of bean rust; yellows-resistant Improved Wisconsin Ballhead cabbage (in cooperation with the Wisconsin Agricultural Experiment Station), seed of which should be in the hands of growers for 1948; a new onion, Yellow Bermuda 986 (in cooperation with the Texas and California Experiment Stations), early, big-yielding, and capable of producing a seed supply in this country at a reasonable cost; a new ring-rot-resistant potato named Teton developed cooperatively with

the Wyoming station, and three scab-resistant ones—Ontario, Seneca, and Cayuga—developed cooperatively at the New York Experiment Station. A number of new types of Easter lilies have been developed through the use of the chemical colchicine.

2,4–D, best know in its capacity as a weed killer, has been found to be more effective than materials now in use in preventing preharvest drop of Winesap and Stayman Winesap apples. Progress has been made also in the use of 2,4–D against many serious weeds, especially root-persistent ones. The best time to spray the weeds, the investigators have found, is when the leaves are well matured and actively sending carbohydrates to the roots for storage. Furthermore, 2,4–D has been found effective and suitable for destroying germinating weed seeds and seedlings if applied at the proper season. It loses its detrimental effects after 2 to 6 weeks if the soil is moist, an important factor in having the land safe for the next crop.

Among other discoveries in the fruit and vegetable field are that certain features of seed development in the Temple orange make it especially valuable in citrus breeding work; that cross-pollination between pecan varieties improves yield and nut quality; that cool weather reduces the fruit set of the early-blooming date palms and that bagging the bloom clusters of such varieties increases the set; that increased frequency of cultivation stimulates young tung trees to much greater growth and is good practice; that tomatoes grown from hybrid seed give promise of higher yields in the central Great Plains; that new types of true-breeding hybrid squashes of high quality can be produced by using colchicine to produce genetic changes; that the yields of cabbage seed can be doubled by isolating the plant beds and so controlling virus diseases carried by plant lice; that sweetpotato plants for the favorable early planting can be produced in much greater quantity through improved handling of the seed roots; that multiplex disease resistance has been developed in a number of tomato breeding lines; and that, through the convenient test of their reactions to the length of day, the soybean varieties grown in the United States have been divided into groups adapted to nine rather narrow geographical zones.

Investigations in the storage and shipment of fruits and vegetables have solved some problems and disclosed the presence of others. A new method for the control of apple scald, one of the worst enemies of the fruit in storage, uses the growth-regulating substance naphthaleneacetic acid and gives promise of lengthening the holding period. A special ripening method for use on unpollinated dates, which are sometimes a considerable part of the crop, makes them a satisfactory product for use in confections. Tests have demonstrated the advantage of speedy transport of field-grown tomato plants from the South to the North by air express, which can be done without special packing, but transportation costs need to be reduced. Prepackaging of some kinds of produce in consumer packages has been shown to affect quality and increase certain kinds of spoilage, and this finding has stimulated studies of the effects of various wrapping films and other container materials.

Results on the winter shipments of sweetpotatoes from South to North show that the best temperature is about 55° F. and chilling injury may result from a 50° temperature unless the exposure is very

short. Cooling carloads of vine-ripened cantaloups by blowing in tons of "snow" ice on top of the load has proved a practical way to ship a better quality of this fruit from California to eastern markets. Losses of string beans from watery rot in shipments from Florida to northern markets can now be controlled as a result of a precooling method in which the temperature is brought down to 40° F.

Improvements in Cotton

Great improvement in cotton has resulted from the establishment and expansion of one-variety communities. Fostered by the Department in various ways, including the general improvement of varieties, methods, and machines, the one-variety communities last year had 40 percent of the acreage and produced 45 percent of the entire American cotton crop.

Until a few years ago 500 varieties of cotton were being grown in the United States Cotton Belt. Now most of the acreage in the one-variety communities is devoted to four-variety types. Cotton specialists believe all requirements, from the standpoints of the farmer, the spinner, and the textile maker, can be met with fewer than 10 varieties. Estimated cash advantage in 1945 to growers in one-variety communities from larger yields and premiums for quality was $62,000,000.

Flax and hemp breeding researches have developed better varieties. Studies to improve quality in abaca, sansevieria, ramie, and other fibers and to develop better production practices for these crops are producing useful results.

Instruments are important in determining the use that can be made of fibers, particularly cotton. Certain instruments, notably the Pressley breaker and the fibrograph, make it possible to predict from quick measurements the strength and appearance of the yarns that can be made from a given lot of fiber. Another, the arealometer, is in the experimental stage. By showing the surface area of fiber in relation to fiber weight, it provides a rapid close measure of fiber fineness. This instrument promises to help the cotton breeders; it will likely do away with many tedious determinations. Heretofore difficulty has arisen in getting the research facts worked out in time for the next planting season.

X-ray studies of the cell-wall of cotton fibers indicate that the efficiency of a cotton variety used for example in automobile tires does not depend exclusively on the strength of the fiber. It is a combination of strength and flexibility, and the flexibility can be shown by the so-called X-ray angle. The bending of X-rays directed through a bundle of fibers reveals facts about the cell-wall structure. A wide angle is desirable in fibers required for some purposes, a narrow angle for others. Apparently the strength of fibers when combined into yarn depends to a considerable extent upon the wall structure of the fibers. Studies of fiber strength and fiber structure enable scientists to determine what type of cotton is best suited for various particular uses.

Verticillium wilt in cottonfields in the Southwest is now being combated with a resistant new variety developed by the Department at the U. S. Cotton Field Station in New Mexico. The new variety, Acala 1517 WR, is wilt resistant and is superior for spinning even to the

very desirable parent, the well-known Acala. Acala 1517 WR is being released this year to commercial seed producers by the New Mexico Crop Improvement Association.

Facts About Nematodes

New knowledge of the nematodes (eelworms, roundworms, threadworms) shows this great group of plant and animal attackers to be of more economic importance than would have been credible a few years ago. The difference between the vigor of weeds and of crop plants, long a matter of comment among farmers, is now coming to be considered largely a matter of relative susceptibility to these widespread undercover pests. Some kinds of nematodes, such as those that produce rootknot disease, attack fruit trees, truck crops, and many other important economic plants. Ornamentals suffer from this pest. Nematologists in the Department have found that the meadow nematode is responsible for the so-called decline disease of boxwoods, both the English and American types.

Yield increases have been brought about through experimental soil fumigation against nematodes. In extreme cases of nematode infestation, fumigation has brought yields as high as 15 times that of untreated areas nearby. One of the most effective fumigants so far tested in a mixture of chlorinated hydrocarbons, a byproduct of the petroleum industry sold under different trade names.

Many new fumigant materials with various advantages are being brought out. The chemical chloropicrin gives the best all-round results as a soil fumigant but is usually too expensive, except in seedbed soil treatments, where cost per unit of area is of secondary importance.

Surer Plant Propagation

Encouraging developments have been recently reported in starting seedlings and cuttings, often difficult for gardeners, greenhouse men and nurserymen. Some of the hormonelike growth regulating substances proved their worth some time ago in stimulating readier rooting of many woody plants more or less difficult to propagate. Now growers have a new method, devised by plant propagators of the Bureau for cuttings and seeds—a fluorescent-lighted propagation box that provides easy control of many propagation factors. Within the last year it has been tried by many professional plant producers and home gardeners.

Reduction of Lumber Losses

Prevention of wood decay in trees as they stand in the forest is a means of avoiding economic loss. Standing trees represent a large investment of time. Stopping wood decay in lumber and in completed wooden structures is even more important, since here the investment is higher. Forest pathologists have announced progress in wood saving through discovery of new facts about burn blight of red pine and jack pine (valuable species for timber and pulp in the Great Lakes area). They have learned much about prevention of decay in stands of oak and western hemlock, and in houses constructed without base-

ments and over moist soil. The house-protection factor is a simple solution. It requires asphalt roll roofing on the ground under the house. This prevents the rise of moisture that might otherwise condense on sills, joists, and flooring and might encourage wood-weakening fungi. Tests have shown the roofing material will last for many years.

Desirable Combinations of Agricultural Practices

Greater use of better fertilizer in better ways increases crop production. During the war years 10 percent fewer workers on American farms, on a crop acreage not greater than that used in World War I, produced 50 percent more farm products. Output per worker went up 75 percent. Significantly, the consumption of plant food was nearly three times what it was in World War I.

Field experiment stations in irrigated areas of the Northwest showed what various combinations of good farm management practices can do. Where alfalfa as ordinarily handled produced an average acre yield of 3.31 tons a year, a combination of several factors soon brought it up to 50 percent more. Adding manure in the rotation brought the average yield to 4.09 tons; adding both manure and mineral fertilizer brought it to an average of 4.88 tons.

At the same station potatoes grown year after year on the same field had declined to an average of 90 bushels an acre, the same as on a nearby reclamation project. In a 6-year rotation of 3 years of alfalfa and 3 years of potatoes, the yield of potatoes rose to 279 bushels. When manure and mineral fertilizers were used in addition, the yield rose to 419 bushels.

Other crops responded in a similar way. During four years at the U. S. Field Station at Huntley, Mont., five crops (alfalfa, beans, oats, potatoes, and sugar beets) yielded more than twice as much in rotations where the better practices were used than in good rotations followed without improved practices in addition.

Various Agricultural Engineering Gains

Agricultural engineering, an important help to the farmer in economizing manpower, is developing important new aids. They include improved machines, structures, equipment, and practices and affect primary processing, such as cotton ginning, as well as farm operations.

Improvements have been made in airplane-spraying equipment for such large-scale pests as the European corn borer and insects which damage forests. Ground-type sprayer-duster equipment has been devised that is proving more effective on many crops than standard equipment for dusting or spraying. New facts have been established regarding the best placement of fertilizer for field corn and potatoes. A sweetpotato vine harvester has been developed and along with it a system of production that facilitates the cultivation and harvesting of both vines and sweetpotatoes. A tung nut huller has been improved. Progress has been made in developing a labor-saving conveyor-type sugarcane loader that loads 156 linear feet of cane a minute. Sugar-beet mechanization developments include topping improvements and a sorting table for separating beets from clods.

New designs of potato storages for the northern States have been adopted by many growers in the commercial potato areas. Plans of various farm buildings and farmhouses are being changed to meet requirements brought about by new farming methods, by the scarcity of some materials, and by the development of new materials. Research on farm housing was discontinued during the war, but is being resumed. There is great need for new knowledge on providing suitable rural living conditions. In cooperation with the Bureau of Human Nutrition and Home Economics, agricultural engineers of PISAE are preparing a series of popular publications on minimum standards and functional design of farmhouses to be made available to the public through the State Agricultural Extension Services.

Studies in the storage of soybeans, now become one of the country's staple crops, have provided facts about time limits on keeping them when they contain various percentages of moisture. Moisture below 11 percent at storage time seems reasonably safe for a long time, according to tests which include forced ventilation with heated and unheated air. Engineering studies in cooperation with dairy cattle investigators of methods of harvesting and curing of forage are providing a basis for producing better feed with less arduous labor and, finally, more nutritious food for the consumer and, probably, more profit for the farmer.

SCIENCE AIDS LIVESTOCK PRODUCTION

The need for meat and other livestock products in a world beset with food shortages calls for the development of more efficient and otherwise superior types of livestock to produce this food. Abundant evidence points to scientific research as a dependable means of obtaining that result.

Studies with beef cattle, under range conditions, have disclosed wide differences in the ability of offspring of different sires to make gains rapidly and economically. Whereas the 2-year-old steers of one bull averaged approximately 1,000 pounds in weight, those of another sire averaged more than 1,200 pounds. Both groups were of the same breed and were handled identically from birth. In a similar comparison involving yearling heifers, those of one sire averaged 650 pounds and of the other 740 pounds. These and other results of carefully controlled tests indicate that heredity plays a major role in determining gains made by animals on the range.

Good gains may generally be expected when the parent stock display heavy weight for age. But the most dependable method of locating superior breeding animals is record-of-performance testing. This consists in determining gains, feed consumption, dressing percentage, quality of carcass, and related evidence of beef-producing ability.

Through a similar system of testing, modified to be suitable for dual-purpose cattle, progress is being made in improving the Department's herd of Milking Shorthorns for beef production while maintaining adequate milk yields of the cows in the herd. In the latest test, steers attained a weight of 900 pounds in 29 days less than the average time for steers of previous years, and their average yield of dressed carcass was 2 percent higher.

Phosphorus Increases Beef Production

In a continuation of studies with beef cattle raised on native ranges deficient in certain minerals, further experiments have confirmed the value of feeding phosphorus supplements in parts of southern Texas. Tests by Department and State investigators, in cooperation with ranch operators over a period of 7 years, have shown conclusively that such supplementation increases both the percentage of calves born and the gains the calves make. One way to supply the phosphorus is to use a suitable phosphate salt in self-feeders; another is to dissolve it in drinking water; and a third is to fertilize the range or pasture with a fertilizer rich in phosphorus, such as superphosphate. Bonemeal and disodium phosphate have proved satisfactory for use in self-feeders. Best results have been obtained when the phosphorus was supplied through fertilized vegetation, but the relative economy of these three methods is yet to be determined.

Conserving Grain in Cattle Rations

In sections of the South where the grain supply is limited, stock owners may fatten cattle satisfactorily if they have plenty of good roughage. Experimentation by the Department and North Carolina Agricultural Experiment Station showed that acceptable market beef could be produced with about two-thirds of a full feed of concentrates when yearling steers received all the good-quality lespedeza hay they would eat. Steers on a full grain feed gained somewhat more and had a better finish but did not yield materially more dressed beef in relation to live weight, nor were they appreciably higher in carcass quality or market grade. The average saving of concentrate feed as a result of limited as compared with full feeding was about 128 pounds per head.

In Oklahoma, cooperative Federal and State studies disclosed the advantage of feeding a small amount of cottonseed cake to yearling steers on summer range during the last half of the grazing season, after July 1. One pound of cake per head daily increased the summer gains per steer by about 50 pounds, and 2 pounds of cake by approximately 70 pounds, over the gains of steers getting only native range grasses. The additional weight and condition enhanced the steers' sale value sufficiently to more than offset the cost of the supplement.

Wrinkleless and Open-Faced Sheep

As a result of several years' study showing that wrinkled skins are an economic liability in Rambouillet sheep, selection for freedom from skin folds is becoming a common practice among Rambouillet breeders. Research at the Western Sheep Breeding Laboratory, Dubois, Idaho, has shown that the wrinkled condition, formerly thought to be desirable, can be bred out of flocks. Experiments have demonstrated that smooth-skinned Rambouillet sheep produce as much clean wool, if not more, have longer staple (unstretched wool fiber), and produce lambs that are preferred by the feeder and fat-lamb market. Smooth sheep are more easily sheared, less subject to fly trouble from shear cuts, and produce more valuable skins. As a result of suitable breeding and selection methods, the percentage of weanling lambs with moderate to

heavy folds has decreased from about 39 percent in 1938 to 5 percent in 1945. During the same period, the percentage of lambs with practically no folds increased from 20 to 77 percent.

Another line of research at the same laboratory has shown that a heavy growth of wool on the face of sheep is undesirable, chiefly because it obscures the vision and interferes with the animal's ability to thrive on the range. This condition also can be bred out of a flock. An open-faced ewe is worth approximately a dollar a year more than a wool-blind one. Producers of breeds of sheep that tend toward wool-blindness are seeking to correct the condition.

Studies of the heritability of desirable characteristics in sheep have shown it to be high for face covering, staple length, skin folds, and clean fleece weight. The values were low for type and condition of sheep. Culling for body weight was shown to be reliable at yearling age but selection for body type and condition is best deferred until results of progeny tests are available.

Jaw Defects in Sheep Impair Growth

In sheep the upper and lower jaws are often of different length. Observations by Department scientists led to the determination that such sheep are not as good producers of meat and wool as normal sheep. Lambs with definitely overshot jaws weighed about 7.5 pounds less at weaning time than normal lambs. The wool of such lambs also was slightly shorter. The defective lambs cannot eat as well as normal ones. As the animals develop, the abnormality becomes more pronounced. Investigations showed the condition to be hereditary. This suggests the inadvisability of breeding sheep with defective jaws.

Progress in Swine Breeding

At Beltsville, Md., efforts to develop superior inbred strains of swine from crosses involving the Danish Landrace have succeeded. Of the six strains now on hand, four trace to crosses of the Landrace with the Chester White, Duroc, Poland China, and Large Black; one to crosses involving the Landrace, Duroc, and Hampshire; and one to crosses involving the Landrace, Duroc, Hampshire, and Yorkshire. Most of these strains closely approach the desired objectives with respect to body conformation and color, but further breeding work is necessary to improve such characters as fertility, rate of gain, efficiency of feed utilization, and a high yield of choice cuts. To bring about the desired improvement, selection is being practiced in combination with varying intensities of inbreeding so that the strains will breed relatively true for the desired characteristics.

Pork Protein High in Nutritive Value

Experiments, with albino rats as the test animals, on the nutritive value of pork have shown that the protein in roast fresh pork, hams, loins, picnic shoulders, and butts is both highly digestible and of high biological value. The different cuts of pork have showed comparatively little difference in nutritive value.

The experiments also involved comparisons of the nutritive value of roast pork with that of enriched white bread, whole-wheat bread,

and rye bread. When a diet containing equal parts of bread protein and meat protein was fed, the mixed protein thus provided was approximately equal to that of pork protein alone for producing growth. When a combination of one part of pork protein to two parts of bread protein was fed, however, the growth-promoting value of the protein of this mixture was somewhat lower than that of pork protein alone, but still much higher than that of bread protein alone. The results showed definitely that pork proteins, which abundantly supply such essential amino acids as lysine, greatly enhance the nutritive value of the bread proteins, which are deficient in lysine.

Eggshell Quality Inherited

Investigations on eggshell quality have shown that the ability of hens to lay eggs with strong nonporous shells is largely inherited. A good shell helps to keep a good egg good and gets it to market more safely. In 7 years poultry scientists of the Department built up, from the same original stock, two lines of chickens, one producing eggs with high-quality shells and the other, eggs with shells that were thin, weak, and porous.

The loss of weight, through evaporation, of eggs of the poor-shell line was from 60 to 70 percent greater than in the other line, when both were handled under the same conditions. The general results of the study indicate the feasibility of eliminating much of the breakage in eggs between hen house and market by breeding from birds with good shell characteristics.

Fried Chicken Satisfies Dietary Need

The recognized value of poultry products in the human diet is emphasized further by the results of research on the niacin content of poultry flesh. Investigators at Beltsville, Md., found that the breast meat of young chickens contained as much niacin (antipellagric vitamin) as pork or beef livers, which are outstanding sources of this valuable vitamin. Fondness for fried chicken thus reflects a dietary need in areas where pellagra occurs as well as taste and appetite.

National Poultry Improvement Plan Aids Industry

Modern breeding practices and pullorum disease control through the National Poultry Improvement Plan have contributed to an increase during the last 10 years of about 20 eggs in the average production per hen in the United States. Participation has increased rapidly and includes more than half of the breeding birds in the country. Hatcherymen, breeders, and flock owners in 47 States cooperate, through State agencies, with the Bureau of Animal Industry in producing chicks of better breeding quality and livability under farm conditions. As in former years, the Department in 1946 issued a directory of high-producing chickens based on production and breeding records obtained under the plan. Systematic testing and disposal of affected breeding birds result in progress against pullorum disease, because mature stock transmit the infection to their progeny through

the egg. Among 4,000,000 breeding birds officially tested in 1936, 3.7 percent were infected; the corresponding figure for 20,000,000 breeding birds tested in 1945 was 2.0 percent.

Biological Products Help Keep Livestock Healthy

At the end of the fiscal year, 68 licensed establishments were operating under regulations authorized by the Virus-Serum-Toxin Act, which this Department administers.

One of the most valuable and extensively used biological products is anti-hog-cholera serum. Its production greatly exceeds that of all others combined. To help insure an adequate supply the Department administers a serum marketing agreement, now in its tenth successful year. Developed in consultation with serum producers and handlers, this agreement provides for adequate reserves of serum and for a system of price control that tends to stabilize production. These supervisory functions with related veterinary services have prevented serious outbreaks of hog cholera and other infectious diseases.

A further safeguard provided by the act is official supervision over the importation of cultures and collections of organisms.

This Department cooperated with the Navy in testing the effects of atomic bombs on biological materials in a remote Pacific area, by furnishing several lots of diagnostic agents and cultures of organisms—all harmless to man in case of their dissemination by the blasts.

Progress of Tuberculosis and Brucellosis Campaigns

In the campaign against bovine turberculosis and brucellosis, a shortage of veterinarians is a continuing handicap. Most of the tuberculosis work consists in retesting herds previously freed of the disease. The percentage of tuberculous cattle disclosed by all testing during the last year was 0.24 percent, equivalent to 1 animal in about 400, the same as for the previous year. It indicated that the situation is under effective control but proved that residual infection still persists. Centers of infection need to be wiped out. Periodic retesting locates such centers.

In recent years, the Federal meat-inspection service has made post mortem examinations of about 14,000,000 cattle annually. The presence of tuberculous lesions in an animal, together with shipping records that show its point of origin, often enables veterinarians to locate the premises from which the infected animal came. Federal meat inspection also helps to show the inroads that certain diseases make on the Nation's meat supply. About a quarter century ago, condemnations of cattle carcasses because of tuberculosis were over 30 times as frequent as now.

In the campaign against brucellosis the number of herds under supervision was about 200,000, the same as a year ago. These herds contain approximately 17,000,000 cattle. About 1,400,000 cattle are on the waiting list, or 400,000 more than last year. In States where the incidence of the disease is relatively low, work has continued under an area plan; 11 new counties were added to the list of accredited bovine brucellosis-free areas. To become accredited, a county must

have not more than 1 percent of cattle react to the test for the disease and must have not more than 5 percent of its herds with reactors in them. Some counties have had to be taken off the list because of a lack of veterinarians to do testing for reaccreditation.

Interest in vaccinating calves 4 to 8 months old against the disease continues to increase, especially in areas where the percentage of infection is high. Since the adoption of calfhood vaccination by the Bureau of Animal Industry and the United States Livestock Sanitary Association early in 1941, more than 1,900,000 calves have been vaccinated in the official work; many more have been vaccinated by private veterinarians.

Control of Bovine Trichomoniasis

Progress was reported in controlling bovine venereal trichomoniasis, a disease of dairy and beef cattle caused by a protozoan parasite. This infection renders heifers and cows temporarily incapable of producing normal calves. Most heifers and cows ultimately recover; but in bulls the infection is usually permanent. When introduced into a susceptible herd, the disease may reduce the number of calves to less than half of normal for a year or two. Subsequently, the effects of the disease may lessen through the development of resistance, but calf production may still be so low that the herd will not be profitable. Though sporadic, the infection is widespread throughout the United States.

No effective treatment yet exists but two methods of control have given promising results. Experimental treatments with iodine compounds have cured 6 of 10 infected bulls. The other method involves herd management based on hygienic breeding. It requires the withdrawal of infected bulls from service, the clinical examination of possibly infected females, breeding them hygienically, and the resting of all females that calve normally for at least 90 days and 2 heat periods before allowing them to breed again. Owners of several infected dairy and beef herds have found the method to be efficacious.

Swine Erysipelas Yields to Research

Swine erysipelas, second only to hog cholera in its economic importance to hog producers, is being controlled by vaccination. In 8 years of cooperative Federal-State work more than 6½ million swine in nearly 100,000 herds have been vaccinated by the use of anti-swine-erysipelas serum and live-culture vaccine. Results have been very satisfactory. Strict control over the production of the serum and vaccine by the Bureau of Animal Industry assures a high standard of quality for these products. Swine erysipelas is transmissible to turkey flocks. Losses of from 5 to 50 percent of the affected birds have occurred. Penicillin in oil injected in repeated doses into the wattles of artificially infected turkeys reduced mortality from 100 percent to 10 percent.

Anthrax Survey Shows Outbreaks During 30 Years

Anthrax, which is one of the world's most destructive animal diseases, has occurred, during the last 30 years, in at least 43 States and has involved 438 counties. The States that appear to have escaped

are Arizona, Indiana, Maine, Michigan, and West Virginia. Cattle are the principal victims, but the disease also affects horses, mules, sheep, and swine. Vaccination against the disease, though not wholly effective, provides good protection. In one large area in the Middle West, which covered parts of 4 States, vaccination combined with sanitary precautions reduced the number of herds quarantined because of anthrax from 1,592 to 56 in a period of 6 years.

Newcastle Disease Studied

Research workers of the Department and cooperating States have begun a study of the highly infectious poultry malady known as Newcastle disease, or avian pneumoencephalitis, which has appeared in several important poultry-growing States. The former designation is derived from the name of a town in England where the disease was first identified almost 20 years ago. The latter name, avian pneumoencephalitis, is fairly descriptive of the main symptoms, which resemble those of the common chicken diseases, infectious bronchitis and laryngotracheitis. Besides the pneumonic condition, nervous disorders and paralysis may also occur.

The studies have already shown that the infection is dangerous to turkeys as well as to chickens. It appears in both a mild and a highly virulent fatal form; even mild attacks retard growth and reduce egg production.

The Department, cooperating with the State authorities, has already made recommendations for the control of the disease, consisting at present of quarantine and sanitary measures.

Deadly Fungus Disease of Man and Dogs

Near Washington, D. C., 2 cases of a rare but highly fatal disease of man and dogs occurred. Known as histoplasmosis, the disease is caused by a fungus. The affected animals were 2 young dogs from a county in which 4 fatal cases in children had been reported in recent years. The chief symptoms in the affected dogs were anemia, progressive loss in weight and condition over a period of several weeks, impaired appetite, and slight intermittent fever. At necropsy the liver and spleen were markedly enlarged and abnormally firm. Only 5 cases of naturally occurring histoplasmosis in dogs were found to have been reported in medical literature. Reported human cases were few; about 100 have been recorded.

Lead Arsenate Cures Diarrhea in Lambs

In tests conducted in western South Dakota, where sheepmen have suffered heavy losses of lambs from a serious scouring condition, investigators of the Department and State experiment station traced the cause and found a remedy. Post mortem examination of several affected animals disclosed large numbers of tapeworm segments, which together with further observations incriminated the common tapeworm as responsible for the trouble.

Taking their clue from previous reports by other scientists that a small amount of lead arsenate would remove tapeworms and not in-

jure lambs, the investigators used this chemical in a 1-gram dose, and found it to be effective. It removed more than 90 percent of the tapeworms, and the treated lambs showed marked improvement in condition within a few days. None of the lambs suffered any ill effects from the drug.

Sulfaguanidine for Poultry Coccidiosis

A search for ways of reducing losses of poultry from the parasitic disease, coccidiosis, disclosed new information and confirmed important findings based on previous work. This disease is widespread, especially among chickens. Mortality generally ranges from 15 to 25 percent of the birds affected. Aggregate losses from it have been extremely heavy. A combination of drug treatment and strict hygiene is the best known means of control. Sulfaguanidine is effective in preventing both the cecal and intestinal forms of coccidiosis. Satisfactory results under ordinary farm conditions have been obtained by feeding 1 percent, by weight, of sulfaguanidine in the mash. Use of the medicated mash should begin as soon as bloody droppings, a common symptom, are observed.

ACCOMPLISHMENTS IN AGRICULTURAL AND INDUSTRIAL CHEMISTRY

Paint brushes from casein, a silklike fiber from peanut protein, rutin from buckwheat, plastics from chicken feathers, and liquid motor fuel from corncobs are now in experimental pilot-plant production in the four Regional Research Laboratories as a result of research by Department chemists.

The Bureau of Agricultural and Industrial Chemistry's more than 1,000 persons that worked on projects dealing with the use of agricultural commodities in the war effort are now back at their old jobs searching full time for new and wider industrial outlets and markets for the products of peacetime farming. The program includes work on rutin, soft-grit blasting, improved cotton tire cords, new uses for low-grade cotton, chicken feed from the residue of penicillin mold, dehydrofreezing, and more than 50 other projects dealing with crop utilization.

Buckwheat Provides Valuable Drug

Chemists in the Bureau's Eastern Regional Research Laboratory in Philadelphia, Pa., appear to be on the verge of making a hero out of the lowly buckwheat plant. They have extracted from the green plants and blossoms of buckwheat a drug called rutin. Rutin gives promise of being beneficial in treating persons suffering from high blood pressure associated with increased capillary fragility. Capillaries are the small blood vessels that serve the remote regions of the body. Age often raises blood pressure and sometimes makes these tiny blood vessels weak. This combination of pressure and weakness may result in a rupture. Such a rupture can cause death when it occurs in the brain, or blindness if it occurs in the eye. Lowering the

blood pressure or strengthening the capillaries would naturally reduce the risk. The results of clinical tests thus far indicate that rutin will be beneficial in strengthening the capillaries. During the past 30 months more than 1,200 cases have been studied by research men at the University of Pennsylvania Medical School and its affiliated hospital. About 20 percent of the patients treated with rutin were suffering from fragile capillaries. Of these, 88 percent were returned to normal through the use of rutin.

Rutin is a tasteless, bright-yellow powder which can be made up and taken in tablet form. It is nonpoisonous and keeps very well under normal conditions. The job of Department scientists is to work out practical and economical methods for extracting the drug on a commercial scale. The clinical work is done by medical people. During the summer of 1945 about 300 pounds of rutin were extracted from green buckwheat plants by four drug manufacturers under the technical guidance of chemical engineers from the Philadelphia Laboratory. The amount of rutin was larger in 1946. The Laboratory is also extracting the drug on a pilot-plant scale from buckwheat grown on its own site. Since the plant is cut green instead of being allowed to mature, it is possible to get two and in some instances three crops of buckwheat in one season when it is used for rutin.

It is roughly estimated that it will require about 10,000 pounds of rutin to meet the experimental demand for the drug in 1946, and more than a million pounds a year to meet medicinal requirements should the present promising results be substantiated and the drug placed on the open market. This would mean that about 50,000 acres of buckwheat would be needed each year for the production of this drug.

Cotton-Utilization Research

The results of research on the utilization of cotton in the Southern Regional Research Laboratory in New Orleans have demonstrated clearly that better truck and passenger automobile tire cords can be made from cotton by selecting varieties of cotton that possess the properties needed for these specific uses.

The recent release of Army service tests of cotton tire cords made in the New Orleans Laboratory and run on vehicles operated by the Ordnance Department on the test course at San Antonio, Tex., and in California, shows the superiority of some varieties of cotton over others for tire purposes. The truck tires were 7.50–20, S4 military type and were made from three selected varieties of cotton, Stoneville SB, Wilds 13, and SXP, and run with tires made from regular commercial cotton cord as controls. Using 100 as a rating figure for the control tires made from regular commercial cotton, the tires made from Stoneville cords gave a performance of 138, the SXP 200, and the Wilds 13, 253.

Equally favorable results were obtained from tests made on 7.00–20, S4 type highway tread truck tires. Results of tests on 6.00–16 passenger-car tires showed that these tires are entirely adequate for present-day high-speed driving when made of either the regular commercial cords or of cords from the selected varieties. At 60 miles an hour these tires ran over 68,000 miles with one recapping, and the carcass was still in good condition. The results of these official Army tests

show that the time has come for us to give more thought to the selection of varieties of cotton which possess the characteristics needed for the things we want to make.

Short-Staple Cotton Uses

The bulk of the American cotton crop consists of short-staple cotton and there is not always a profitable market for all of this part of the crop. The Southern Laboratory is conducting considerable research in this field in the hope that it may result in the wider utilization of at least a part of these shorter staples.

A considerable portion of these short staples goes into the production of industrial fabrics. They receive little if any chemical finishing treatment and because of their rough appearance do not appeal to the consumer trade. Chemists took ordinary bag sheeting that is used for making sacks and finished it by the standard method of kier-boiling, bleaching, mercerizing, and dyeing with fast vat colors that are used in the production of the higher quality fabrics. By following this method the scientists were able to produce a fabric with a nice linenlike finish that appeals to the eye.

As a result of this research a considerable amount of low-grade cotton that was originally used in the production of bagging and similar low-cost products, may now be used for making garments, slip covers, draperies and so on. The method is being tried on a semicommercial scale, and the results thus far lead the scientists to believe that attractive fabrics suitable for a variety of uses can be made from these ordinary sheetings at a reasonable cost by following the regular commercial finishing process that is used on the higher types of fabrics. Tests showed that this bagging fabric also responds satisfactorily to the treatment to prevent shrinkage during laundering.

New Artificial Fiber

A synthethic fiber from different agricultural products is now being produced on an experimental scale in each of the Bureau's four Regional Research Laboratories. These fibers are being developed not to replace cotton, wool, or other natural fibers, but in the hope of improving the natural fibers by mixing with them some of the better characteristics in the synthetic fibers. Sarelon is the name given to a new artificial fiber that is being produced experimentally in the Southern Laboratory. It's made from peanut protein. This new fiber has a light-cream color, and a soft pleasant feel about midway between that of silk and wool. In heat-insulating and moisture-absorbing properties it resembles wool. It shrinks very little in hot water, and takes dyes similar to those used on silk and wool. It may be used alone or mixed with cotton or wool fibers. The major weakness of Sarelon, as in other synthetic protein fibers, is its low wet strength. Efforts are being made to improve this property, but it may be necessary to make a more basic study of the structure of the peanut protein molecule before this weakness can be overcome.

Casein-Fiber Improvement

Scientists have known how to make casein fiber for a good many years, and are directing their efforts now toward improving the fiber,

simplifying the manufacturing process, and finding new uses for it. As a result of the commercial interest in this fiber as a possible substitute for imported hog bristles, used extensively before the war in the production of paint brushes and other types of brushes, the Eastern Laboratory has developed a continuous process for the manufacture of casein bristle. This development makes it possible to carry the fiber to the finished stage without having to resort to batch handling, which slows down the operation and increases the cost of production.

By using the latest quinone hardening treatment which draws the fiber through a chemical bath with a temperature of 113° Fahrenheit the fiber is hardened much faster than when the bath is held at room temperature. As the fiber comes from the bath, it is wound on a new type of reel designed by laboratory scientists so that the fiber advances automatically as it is wound on the reel. By using a large reel continuous production now seems assured.

The continuous process is not only more economical, but it yields a slightly more uniform fiber than the vat process. One commercial firm has decided to manufacture casein bristle according to the method developed in the Philadelphia Laboratory and plans to make trial runs when the necessary equipment is installed in the already-completed building.

Artificial Fiber From Corn

An artificial textile fiber that appears to be suitable for blending with wool for knitting yarns and woven fabrics is being produced on a pilot-plant scale from the protein of corn in the Northern Regional Research Laboratory at Peoria, Ill. It is called zein.

Finished zein fiber has a rich creamy appearance. Its dry strength is almost equal to that of wool. The wet strength is only about half of the dry strength, but believed to be superior to that of any commercial synthetic protein fiber made thus far. The fibers are not damaged by washing with soap solutions. Zein is a protein that comes from the gluten of corn. The fiber is made by preparing the spinning solution from zein and caustic alkali, aging it for several days, and then pumping the solution through suitable spinnerets. The wet jellylike threads that come from the spinneret are coagulated into continuous filaments and subjected to suitable chemical and physical finishing treatments. It is believed that the spinning and finishing of zein fibers can be made continuous, since the time required for finishing treatments is less than in other protein fibers. One commercial company is getting ready to start the production of zein fiber on a pilot-plant scale, and the textile industry generally has shown considerable interest in this new product.

Utilization of Feathers

Feathers like wool, hair, hoofs, and horns are composed largely of a fibrous protein called keratin. Keratin has physical and chemical properties that make it ideal for protecting animals against injury by exposure to water, wind, heat, cold, and forceful contact with objects. It does such a good job in its natural field that chemists in the Western Regional Research Laboratory at Albany, Calif., felt that it would be an excellent material for a synthetic fiber if a method could be worked out for producing it.

Chicken feathers are an outstanding example of keratin material that is largely wasted. It is estimated that around 200 million pounds of chicken feathers are wasted each year. Fundamental research looking toward the industrial utilization of at least a part of this material has been going on in the Western Laboratory for a number of years. This research has led to the production on a pilot-plant scale of keratin or chicken-feather fiber. The wet strength of this new fiber is still too low for practical purposes, but the chemists are working on that phase of the problem and feel that they will eventually solve it.

Chicken-feather keratin can also be used in making plastics. It dyes readily and effectively in almost every color. The Western Laboratory has made many kinds of plastic dishes, cups, smoking trays, and so on which contain about 25 percent of chicken feather material, and they seem to stand up very well in ordinary usage. Feather-produced keratin is a very stable form of protein and its low cost and ease of coloring makes it suitable for use in the plastic industry.

Soft Grit for Cleaning Engines

Out in the Northern Laboratory, Department workers have developed a soft-grit blasting method for cleaning carbon and grease from gasoline engines. The material used for this is a combination of ground corncobs and whole rice hulls, both largely waste products of the farm. The Navy used this material for cleaning cylinders and pistons of its airplane engines during the war. The material is composed of 60 percent ground corncobs and 40 percent whole rice hulls and is used in regular air-blast equipment.

This new method has several advantages over the methods of cleaning that have been in use for a long time. It removes carbon, oil, and other deposits and gives the metal a clean polished surface without grinding away or reducing the size of the cleaned parts, and it is about 10 times faster than the work can be done by hand. As a result of this research first in a laboratory and later on a pilot-plant scale the soft-grit blasting method is now going into commercial use. One large company that rebuilds automobiles has adopted this method for cleaning pistons, fuel and water pumps, and carburetors. Another company is cleaning its aluminum foundry cores by the soft-grit method; still another is using this material for cleaning its glass molds. A large oil company is using it for removing paint from the roofs of its large gasoline-storage tanks, because the soft-grit blast material does not produce sparks.

Vitamins From Mold Residues

A considerable amount of mold residue results from the production of penicillin by the submerged fermentation process which is used largely now in the production of this drug. Chemists in the Northern Laboratory, which did the research that made it possible to start the early production of penicillin on a commercial scale have found that the mold *Penicillium Chrysogenum* produces riboflavin and other B-complex vitamins while it is making penicillin. They dried some of the mold residue and submitted it to the Bureau of Animal Industry which fed it to growing chickens. The report showed that the dried product, when fed at a 3-percent level to growing chickens, supplied

enough riboflavin to prevent "curled-toe" paralysis and to support as good growth as could be obtained with similar basic feed. As a result of this research large quantities of currently wasted penicillin mold residue may now find a useful outlet in the feed field.

Better Utilization of Fruits

Six companies in the United States and three in Canada now have equipment for recovering the volatile flavor of apples according to the method worked out on a pilot-plant scale in the Philadelphia Laboratory. The latest work in this field is the comparison of apple varieties to see which ones produce the best essence or flavor. The varieties of apples commonly available at the Eastern Laboratory include McIntosh, Jonathan, Stayman Winesap, Grimes Golden, Baldwin, Red Delicious, Golden Delicious, Northern Spy, and Rhode Island Greening. The best essence was obtained from McIntosh and Delicious, both the Red and Golden. Stayman, Jonathan, and Baldwin produced good essence. The essence from Grimes Golden and Northern Spy was rated as fair, and that from the Rhode Island Greening as poor. The results of this research will help the manufacturers of jelly, candy, and so on to select the right essence for the best results.

A new process of food preservation that combines most of the advantages of dehydration, such as reduction in weight and volume, with freezing preservation is the result of research in the California Laboratory. Dehydrofreezing is the name of this new method which carries the product through the first stages of dehydration and then freezes it. The product retains many fresh-quality characteristics since the vitamins and flavor are virtually undamaged by the initial dehydration treatment. Boysenberries and apricots preserved by this method were almost as good as the fresh products.

Research is also under way in the California Laboratory in cooperation with commercial processors of canned grapefruit juice in an effort to aid the canners in Arizona and California to turn out a more uniform juice throughout the season. The juice that is canned is sometimes just right, and sometimes a little tart or a little bland, depending on the time of the season it is produced. Research is aiding in working out this problem.

The results of research in the Western Laboratory show that it is now possible to produce a modified pectin from fruit wastes at a cost appreciably less than that of producing pectin by the alcohol method, which is generally used. This new development, which is a continuous extraction method, is undergoing pilot-plant tests in an industrial plant in Southern California where large quantities of citrus wastes are available.

Improving Food Value of Candies

A cooperative project between the Southern Laboratory and the National Confectioners Association is making headway in the development of candies containing new agricultural products that are particularly high in protein. Cottonseed, peanut, soybean, and other oilseed, cereal, and legume products, which are good sources of protein, have been successfully incorporated into experimental batches of candy which were stored and tested under varying conditions of

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temperature. These products have been used in the experimental production of hard candy, caramel, fudge, coconut pieces, nougat, and creams. The results show that from 4 to 7 percent of pulverized products derived from peanuts, soybeans, wheat, or cottonseed could be incorporated into nougat, caramel, and fudge without materially changing the usual characteristics of these candies.

Starch, Alcohol, Rubber Substitutes

The shipment in December 1945 of the first carload of starch from the sweetpotato-starch plant at Clewiston, Fla., marked another milestone in the application of Government research by industry. This modern seven million dollar plant is the outgrowth of over 15 years of research by the Bureau of Agricultural and Industrial Chemistry. It will afford an outlet for about 12,000 acres of potatoes per year, and turn out around 50 million pounds of root starch as well as about 20 million pounds of carbohydrate livestock feed.

The alcohol-extraction process for getting oil from soybeans leaves a more palatable meal than when the oil is extracted by hot pressing or with petroleum solvents the two methods in general use today. To make it possible for processing plants to take full advantage of this better quality meal, the Northern Laboratory has developed a continuous alcohol-extraction method which is giving satisfactory results in pilot-plant production. Soybean meal produced by this method is superior in both color and taste to meal produced by present methods. This development will undoubtedly increase the use of soybean meal in food products since soybean meal is such a valuable source of protein.

A rubber substitute that can be made from fermentable carbohydrate material is being developed in the Eastern Laboratory. It is called lactoprene since it is derived from lactic acid. The yield of this rubber is very high and almost 1 pound of finished rubber can be obtained from 1 pound of carbohydrate material. These acrylic "rubbers," as they are called, possess a number of outstanding qualities, such as resistance to enlargement of cuts, deterioration by oil, oxidation, and aging at normal or even elevated temperatures.

Naval Stores

Naval stores means turpentine and rosin, which are produced from the sap or gum of certain pine trees. More than two-thirds of the approximately 25 gum-cleaning plants in operation today use the improved gum-cleaning method worked out by naval stores scientists in the Bureau of Agricultural and Industrial Chemistry. This method produces a higher quality rosin which brings more money than the cloudy-colored rosin produced from dirty gum. The increased number of central gum-cleaning plants is showing a corresponding increase in the number of small gum farmers who are using the gum from the pine tree as a cash crop. Approximately 40 percent of the gum produced today is processed into turpentine and rosin at central stills using the improved method worked out by Department scientists.

Motor Fuels From Crop Residues

A two-story factory-type building has been constructed on the grounds of the Northern Laboratory to test the semicommercial pro-

duction of synthetic liquid motor fuel from corncobs and other farm residues such as sugarcane bagasse, peanut shells, flax shives, and the hulls of oats, cottonseed, and rice. The results of laboratory research showed that from 90 to 95 gallons of liquid motor fuel can be obtained from a ton of corncobs or cottonseed hulls, and that half of this is in the form of ethyl alcohol. It is estimated that as much as half of the 200 million tons of farm waste produced each year might be available for use in making motor fuel according to this new process.

INSECT AND PLANT PESTS

Methods for the control of some important insect pests have altered materially within recent years, largely as a result of the development of more effective insecticides and of improved equipment for applying them. Investigations have changed the character of some large-scale insect-control projects, such as the gypsy moth work, and of some quarantine procedures concerning Japanese beetle. The new insect-control methods make effective and efficient operations possible over wider areas.

Gypsy Moth Control Work

Tests with DDT applied by means of airplanes again demonstrated the effectiveness of this insecticide in the control of the gypsy moth. Nearly 100 square miles of forest area were treated with DDT by 10 airplanes in 1946.

With ground-equipment methods and materials, it was previously necessary occasionally in forest areas to place lines of hose more than 2 miles from the location of the spray unit. An operating crew of 10 to 15 men was required for each spray unit. Under average forest conditions, from 200 to 300 acres were treated by each unit during a control season.

Of course, the ground-equipment method continued to be used. New types proved effective.

Approximately 25 square miles of roadsides, woodland margins, and small forest tracts were treated during the year by means of newly developed blower-type machines. Probably, at least 12 of the standard-type spray units previously used would have been required to treat the acreage covered by each of the blower devices for identical periods of time.

The new methods and materials have other advantages. Prior to 1942 the annual use of arsenate of lead for gypsy moth control averaged 1,600,000 pounds, applied at rates varying from 30 to 50 pounds per acre in 600 gallons of water. Less than 85,000 pounds of DDT, a more effective insecticide, was used this year. Spray work with arsenate of lead could not be started until about May 15, when foliage had become well developed; and since pupation of the insect occurred about July 1, such spray work had to be discontinued then. The effect of DDT is not lost for about 6 weeks. Hence, with this insecticide it is possible to start control operations in April, before the eggs hatch. This work was accomplished by the Bureau of Entomology and Plant Quarantine in cooperation with the States of Pennsylvania and New York.

Careful observations throughout the 1946 control season disclosed moth survival in just three areas treated by aircraft, and these areas were re-treated. Final appraisal of the work in 1946 is not yet possible. But 3 years' experience with DDT applied by the new methods opens a bright future for the control of the gypsy moth.

Aerosol Method of Applying Insecticides

The control of insects on vegetable crops by means of aerosol insecticides shows promise. Various aerosol insecticidal mixtures have been developed for field and greenhouse use which do not injure plants. Satisfactory apparatus for applying aerosols to control a number of vegetable insect pests has been developed and tested under field conditions.

The pea aphid was satisfactorily controlled with 10 pounds of aerosol per acre in large-scale field tests in cooperation with the University of Maryland. Applications made at temperatures ranging from 55° to 84° F. resulted in an increased yield. The aerosol applicator was attached to a light pick-up truck, which traveled 5 miles per hour, so that 12 acres could be treated in 1 hour, at a cost for labor and materials much less than that involved in other insecticidal applications.

The aerosol method gave more effective control than any formerly employed for onion thrips on cucumbers in commercial greenhouses. Much less time was required for a man to treat an acre of cucumbers in greenhouses than with commonly used methods. No other insecticidal treatment has been satisfactory in the control of leafhoppers which transmit aster yellows disease to lettuce; but these insects were controlled by applications of an aerosol formula at the rate of 10 pounds per acre at intervals of 7 to 10 days during May and June. Only 11 percent of the plants in treated plots were affected by the disease, while 72 percent of the plants in check plots were diseased.

Plants Resistant to Insect Damage

Some strains of plants inherently resist insect attack and damage. This has interested entomologists and plant breeders for many years. The use of resistant strains of plants that usually cannot as yet be treated for insects economically sometimes materially reduces crop losses caused by insects, and permits profitable production without resort to other insect control methods.

Both hard and soft varieties of winter wheat resistant to the hessian fly have advanced toward commercial release. One variety, which inherits its insect resistance from Illinois No. 1–W38, may be released in Indiana in 1948. Two varieties, Poso 42 and Big Club 43, are being grown commercially in California and continue to perform satisfactorily. Derivations of P. I. 94587 indicate the highest type of resistance under intensive hessian fly attack in greenhouses.

The semiresistant variety Pawnee, developed by the Kansas Agricultural Experiment Station in cooperation with the Department, was comparatively free from infestation during 1945 and 1946 in extensive plantings in central Kansas. Standard varieties in the same area were moderately or severely infested.

Several barley varieties were found to be resistant to the hessian fly when subjected to severe infestation in greenhouse tests.

Varieties of sugarcane resistant to injury by the sugarcane borer have been bred in Louisiana. One of these has been released to commercial growers in Florida. Varieties that show promise for commercial use are rated for borer injury. Moreover, the knowledge that some canes do not suffer heavily from borer damage is of value in determining what plantings should be treated with insecticides for borer control.

Some corn lines have been found to be comparatively unattractive throughout their growth period to European corn borer moths for egg laying. Dent corn inbred line P8 is apparently outstanding for tolerance to infestation by this insect. A number of dent corn, sweet corn, and popcorn lines apparently possess considerable resistance. Some inbred strains of Evergreen sweet corn apparently have some resistance to the European corn borer and also to the corn earworm. Corn earworm damage has been decreased in single crosses of resistant inbred lines with susceptible lines. However, additional resistant lines were necessary in three-way or double crosses to provide high protection from this insect. Selections of the flour corn line No. 221 show resistance to the earworm. Among hybrid strains of southern corn, Louisiana 1030 appears promising as a source of earworm resistance.

Cotton plants apparently resistant to injury from aphids may possess such resistance because of the absence of hairs on the leaves. The location of hairs on the cotton leaf seems more important than average hairiness of the leaf. Cotton strains with the greatest number of hairs on the veinlets are most susceptible because the insect is afforded a higher degree of physical protection from adverse weather.

New Cotton Insect Control Methods

Increase in yields of cotton per acre followed the experimental use of a dust mixture containing DDT for the control of plant bugs and stinkbugs in Arizona. The increase ranged from 283 pounds of seed cotton per acre, or 27 percent, to 972 pounds, or 249 percent. The beet armyworm and the cotton leaf perforator were also effectively controlled in these experiments. A computed gain of 750 pounds of seed cotton per acre followed the experimental application of small amounts of gamma-benzene hexachloride in pyrophyllite four times during the season against several species of stinkbugs and plant bugs. In other tests this material was more effective than DDT when used for the control of boll weevils and plant bugs, although calcium arsenate produced the highest boll weevil mortalities.

Injurious aphid infestations on cotton were prevented experimentally by the addition of nicotine to alternate or all applications of insecticides used for boll weevil control. Calcium arsenate gave an average increase of yield over checks of 126 pounds of seed cotton per acre, or 7.7 percent, while combinations of calcium arsenate and nicotine gave an increase of 365 pounds, or 22.5 percent.

Prevention of Pest Entry Complicated by Airplane Travel

The rapid postwar development of air commerce complicates the problem of preventing the entry of foreign plant pests. During 1946 over 58,000 airplanes were inspected at 45 ports of entry. This is an increase of 28 percent over the number of planes inspected during 1945.

Civilian air traffic is now replacing military air traffic. Since each commercial airline has its own hanger and terminal facilities on airfields, proper quarantine inspection service is very difficult. At the close of the fiscal year 1946, for example, 22 commercial airlines were operating between Puerto Rico and the mainland.

Prohibited material was taken from more than 12,000 of the airplanes inspected. This represented an increase of 66 percent over the number in 1945, though the number of airplane arrivals increased only 28 percent. Much of the prohibited material was of tropical or subtropical origin. The importance of plant quarantine clearance of aircraft from abroad can hardly be over-estimated. Most of the material from tropical sources was found on planes landing in the southern portion of the United States where conditions are favorable for the ultimate survival of such insects and plant diseases.

A total of 3,368 interceptions of insects and plant diseases were made from aircraft during the year. Plant pests were found in plant material carried in baggage, cargo, mail, and stores. Some of these might become of great economic importance if established in this country. These figures, a substantial increase over former years, emphasize the growing importance of the airplane as a rapid means of transportation for pests between countries and even continents. How to prevent their entry and establishment in this country is a problem of increasing difficulty.

Damage From Horn Flies Reduced in Kansas

The magnitude of beef and dairy products losses occasioned by one insect species, the horn fly, was demonstrated in Kansas in 1945. In cooperation with the Kansas State College Extension Service, the National Livestock Loss Prevention Board (Southwestern Region), the Kansas State Livestock Sanitary Commission, and a number of cattlemen, farmers, and dairymen, the Bureau of Entomology and Plant Quarantine conducted 30 demonstrations in 16 Kansas counties to indicate proper treatment of cattle and barns with an insecticidal formula containing DDT. Arrangements were made with cooperating cattlemen to weigh cattle before the treatment as they went to spring pasture and again in the fall after the treatment. Stock treated with DDT gained an average of 300 pounds of beef per animal over untreated stock during a 60-day fly period. On the basis of this work, it was estimated that the total loss of beef in Kansas because of injury by these flies to stock amounted to 86,040,000 pounds. This would be a finacial loss amounting to approximately $8,640,000. The loss to beef and dairy cattle industries in Kansas during 1945 was estimated to be approximately $10,000,000. The cost to the Nation from horn-fly injury as affecting the cattle and dairy industry is estimated to exceed $100,000,000 annually.

It is considered that one-tenth of the beef and dairy cattle in the United States were treated with this insecticide during the summer of 1946. The resulting gain in beef production for the year probably will be millions of pounds.

Insects in the Nation's Forests

Spruce budworm, one of the most damaging insects in forest areas, was discovered in considerable numbers in the Adirondack region in

northern New York State in June 1945. The present year's growth of some trees in this area will be completely defoliated. There has been a slight increase in the budworm infestations in Vermont, New Hampshire, and Maine, and some defoliation has been noticed in Colorado.

Another insect, the Engelmann spruce beetle, continued to cause much destruction in Colorado. Over 3 billion board feet of timber have been killed by the beetle in that State during the past 4 years. This insect has killed 84 percent of the Engelmann spruce on the White River National Forest. It has been estimated that the present rate of timber loss due to this insect on all forest lands in Colorado is from four to six times the annual growth.

Practical field tests with new insecticides and formulas, together with new equipment and methods for applying them, including the use of aircraft, have been conducted. These experiments indicate new avenues of approach in controlling the spruce budworm and many other defoliating forest insects.

Improved Certification Treatments for Infested Nursery Stock

The use of DDT for treating soil in nursery plots and for treating potting soil as a means of obtaining certification of plants grown in such soil was authorized March 21, 1946. Both the amount of insecticide necessary and the labor required for making the application are reduced. This new insecticide may supersede the one previously used for treating plots of nursery stock as a basis for certification.

An easier method of obtaining certification of bare-root woody plants was authorized on November 2, 1945. Stocks with small amounts of soil adhering to the roots are now given a quick dip in an emulsion containing ethylene dibromide and ethylene dichloride, held for a short period to dry, and then declared eligible for shipment. Previously it was necessary for growers to shake off loose dirt carefully and then wash off the remaining soil either by applying considerable water pressure or by sloshing the plants about the troughs or tubs of water. Such handling often damaged roots or rootlet systems and involved considerable expense for labor and equipment, as well as delay in making shipments.

Control of Pink Bollworm

The most destructive insect enemy of the cotton industry in the world, the pink bollworm, was discovered in 1945 to have spread into new areas in Texas. This spread apparently occurred during the 1944 season by natural movement of the moths from heavily infested sections farther south. For the 1945 season the State of Texas modified the requirements on the period when cotton could be grown in the lower Rio Grande Valley to provide for the destruction of cotton plants by August 31, 1945. Similar requirements were imposed by the Mexican Government for the contiguous area in Mexico. These requirements were effectively carried out, and the pink bollworm population in this area was reduced below that of previous years.

Experimental work with new insecticides during 1945 indicated that field applications of DDT would aid in the control of this pest. Accordingly, the control program for 1946 provides for intense inspection of cotton fields in the heavily infested area in the lower Rio Grande

Valley of Texas and Mexico to locate infestations of the pink bollworm as they appear. Infested fields will be treated with DDT to kill developing larvae and thus prevent the development of adults which can move into new areas and reproduce.

The insecticidal applications, however, will not be sufficiently effective to eliminiate the pest. It will be necessary to continue the control program consisting of short cotton-growing periods together with thorough field clean-up. By these combined means the pink bollworm may be held in check so that more drastic measures will not be necessary to prevent its further spread in the cotton-producing areas of the South.

ESSENTIALS OF CONSERVATION

Knowledge our farmers have acquired in conserving and wisely using soil enables them to continue feeding this nation liberally, and to provide large quantities of food for hungry nations. It aids them to crop and yet not excessively deplete the soil. They do not always fully apply this knowledge, but to the extent that they do so, the entire Nation benefits and indeed other nations also

The practice of soil conservation by United States farmers in the years that immediately preceded World War II yielded gains in stored and restored soil fertility. This came in handy. Necessarily, however, food demands in the war years obliged farmers to draw on soil resources; meantime, pressure of farm work, shortage of labor, and other handicaps interfered with conservation work.

Hence, with claims upon its food supply running higher than ever, the Nation must now look to the future and make the best adjustment possible between the immediate call for sustained high production and the long-time duty to protect the soil.

Formerly, American farmers if they wasted soil could move on to new soil within the Nation's borders. Today, that opportunity has largely disappeared; we do not have much more good land that can be profitably opened without encroaching seriously on timber and grass areas. If we do not apply conservation methods widely, we shall destroy old farm land much faster than irrigation or drainage or forest clearing can provide new. In the first third of this century we ruined or nearly ruined a million acres of crop land every year; it is impossible even for the United States, with its unrivaled soil resources, to stand a drain like that. Our soil resources have limits, which now become visible; if we do not conserve these resources, we shall regret it, because the alternatives are highly undesirable—either a lower national standard of living or ultimate heavy dependence on food imports.

Scientifically protected and used, however, our soil resources will provide food enough for our maximum probable population, plus a considerable surplus for export. Farmers for the most part know what should be done; they have had considerable education and considerable experience in soil conservation. But the Nation must support the farmers. Specifically, the Nation must recognize the importance of maintaining a proper balance between soil-depleting and soil-conserving crops and of devoting different lands to different uses.

Partly a Public Duty

Soil conservation is partly a public responsibility; it involves broad social considerations, such as land speculation, land-tenure conditions, flood control, watershed protection, and forest management. In many regions the individual farmer, with no community backing, can accomplish little; he may be up against problems that can be solved only by cooperation among practically all land users, public as well as private. In that event, the work halts until the community lends a hand.

These principles, though familiar, need reiteration in reference to current needs. Under the pressure of the wartime and postwar food emergencies, the Nation's conservation job lagged in some ways. Farmers who had been asked to increase their acreage of the oil crops often found themselves obliged to upset their crop rotations, with resulting harm to the soil. Many had to increase excessively their acreage of intertilled and consequently soil-depleting crops. Close-growing crops, which tend to protect the soil, were in less keen demand. Wartime needs dictated the harvesting of some crops that normally would have been turned under for green manure and also involved much plowing of pastures and meadows. Frequently, crop shifts induced by the food emergency were not in harmony with soil conditions. What the farmers did was necessary, but it left some damage which must be corrected. Soil problems result from multiple causes and require multiple remedies, among them awareness among nonfarmers of the extent to which they can help.

Principal Conservation Aids

Soil conservation may benefit notably from better care of forests and woodlands, such as contributes to flood control, watershed protection, and restoration of the vegetative cover. It benefits similarly from the prevention of overgrazing in the national forests, on the public domain, and on private range lands. Under wartime conditions stocking of the ranges proceeded in many areas beyond the danger point, and created worsened hazards of vegetation-change and wind-erosion. Care for the soil, with other objects than crop-growing in view, benefits crop growing also, since the effect spreads beyond the areas immediately involved. Applied, for example, in the form of sustained-yield lumbering it may protect extensive agricultural valleys from floods and gullying. Modern technology, it should be borne in mind, involves increased soil hazards, from the extent to which it facilitates the exploitation of resources. It offers countervailing powers of control; but if these are to be effective, they must be exercised in many cases through extremely wide cooperation.

Famine in Europe and Asia continues the extraordinary strain which the war imposed on American farmlands. How long it will be until large food-growing areas in other countries again are in full production and people all over the world have at least as much to eat as they had before the war, no one knows. It may be as long as 2 or 3 years.

This delay will create additional hazards for American agriculture, particularly in threats to croplands. Whether more needless damage will result to our farms, or whether the threats fade into insignificance,

depends on how extensively and intensively agriculture uses safe conservation methods. The Soil Conservation Service believes it will be impossible to avoid all soil damage; but conservation practices, if widely adopted, will help to hold such damage to a minimum and will increase yields as well.

During World War II, American farmers were asked for production greater than any ever attempted before. They responded; but two important facts about their achievement stand out.

First, some damage was done to our croplands. The damage was not as great as that inflicted during and after World War I. Less natural grassland was plowed up. Nevertheless damage to unprotected croplands, pastures, and woodlands occurred.

Second, conservation farming methods, on the millions of acres on which they had been established, contributed heavily to the war crop production. Acreages required to produce most of our important wartime crops were less than would have been necessary had these conservation methods not been widely followed. On the other hand, if *all* United States farmlands had had the advantages of soil and water conservation programs and practices, the required acreage would have been still smaller.

High-level peacetime farm production to alleviate famine and relieve other crop shortages requires conservation programs. With such programs, less actual acreage will be required.

Records of Conservation Results

Records kept by the Soil Conservation Service, or reported to that agency by farmers, show that conservation measures have brought increases varying from 20 to 30 percent in per acre yields of various important crops. This is an average figure for a number of different crops. For some crops, the increases reported have been much higher; in some instances they were smaller for various crops.

If such measures could be established overnight on all crop and pasture lands, roughly 25 percent less actual acreage would be required to produce necessary crops.

Approximately 43 million acres are now in crops not suitable for cultivation. It would be much better for the United States if it were not necessary to plow that land any more. It is not practicable, however, to retire it from cultivation immediately. We should look forward, however, to taking those 43 million acres out of crops, as soon as we can do so without reducing production below needs.

Conservation farming provides a basis for fixing crop goals. Land classification by Soil Conservation Service determines what uses of a given piece of land will be most efficient, in view of the length and degree of slope, the soil, the moisture conditions, and other factors. This one feature of conservation farming is a material help to the United States in meeting world food quotas with minimum of damage to the land.

Most of our wheat production is winter wheat. Nearly half the winter wheat production is in Kansas, Texas, Oklahoma, and Colorado. Much wheat from these four States is grown in the area which constituted the "dust bowl" 10 years ago. Studies by Soil Conservation Service technicians show that by no means all of the farmland in that area is adapted to wheat growing.

In a year with adequate rainfall and other favorable conditions, wheat growers usually make a fair to good showing, even on land not generally suited to wheat. In a bad year, drought and high winds curtail the wheat crop, and damage the land itself. The dust-storm years were 1934, 1935, 1936, and 1937. On countless acres young wheat crop was blown out of the ground. Some farmers lost crops several times, along with much soil.

Land Classification Aids Crop Choice

Part of the remedy is to use land for the crops best suited to it. The land-classification system provides an established basis for the selection.

Only three of the eight classes of land are suitable for continuous cultivation of any kind: These are classes I, II, and III, which total about 495 million acres. Land in these classes now produces the bulk of our cultivated crops and will continue to do so. Every care, beginning with proper use of the land, should be taken to see that this land is farmed for the highest crop production with the least waste of soil. Such care stands back of our national welfare.

But the land use problem demands more than simply criteria. Much work is necessary to prevent erosion, and at the same time to increase production, on practically all the productive land of the Nation, an area of some 950 million acres if we include croplands, grasslands, and woodlands. The only land in farms that does not need the benefits of conservation practices is Class I land, which amounts to around 75 million acres, and Class VIII land, which is suitable for nothing but wildlife and recreation and totals about 18 or 20 million acres.

Estimates of Conservation Needs

The Soil Conservation Service has made a study of conservation needs in every State. This study indicates that some 90 million acres of farm land needs terracing, and about 100 million acres needs strip-cropping. Another 125 million acres need simple contour cultivation. These are requirements for croplands. Grazing lands and woodlands need other protective practices, such as rotation grazing on some 220 million acres, and prevention of grazing damage on some 100 million acres of farm woodlands.

This will require work, equipment, materials, and time. Some 3½ million man-years of labor, including technical supervision, will be needed. Large amounts of motorized and horse-drawn equipment will be needed.

Briefly, the soil and water conservation problem has two phases. One is the need to meet world relief requirements fully and quickly, without undue damage to soil and water resources. The other is to proceed as rapidly as possible with the long-time job of establishing conservation farming practices on all farm lands. Facilities for both jobs are ready.

The land-classification system has been mentioned; it provides a sound basis for allotting crop acreages with as little risk to our total land resources as possible. For the long-run job, Soil Conservation districts—now authorized by laws in each of the 48 States, and totalling 1,576 throughout the country—provide effective machinery for

applying conservation practices. To the end of 1945, more than 77 million acres had been treated with complete conservation programs, in and out of Soil Conservation districts, under the supervision of the Soil Conservation Service. But approximately 900 million acres of farm land still need this care.

Crops for Poor and Hilly Farms

Hill-culture research of the SCS finds crops that fit poor and hilly farm lands and that pay on them. One of these crops is wild beach plum. Native to barren sand dunes of northeastern United States, the beach plum will grow as far west as Iowa. This hardy plant helps to prevent erosion, and the tart-flavored fruit makes good jelly and preserves. A 5-year test with wild beach plums on an acre of low-grade farm land at Beltsville, Md., showed the plant can make good returns on poor land under soil conservation practices. After 5 years, the plants yielded 60 bushels of fruit worth $240. The land was prepared and seeded about the same as for corn, in 5-foot drill rows.

At Auburn, Ala., the miracle vine—kudzu—increased return by $10 to the acre on a plot of poor farm land over a similar plot under ordinary corn-cotton rotations. A 4-year rotation of cotton-corn-kudzu-kudzu netted the farmer $40 an acre more than a similar field with a repeated cotton-corn rotation. On the second field, 48 pounds of nitrogen an acre was used to fertilize the cotton and 32 pounds of nitrogen to fertilize the corn. Other examples of crops that will grow on hilly land are cane and vine fruits such as black raspberry and grapes, which "anchor" soil and utilize waste areas on many farms.

Climatic Hazards of Farming

Giant dust storms of the early 1930's vividly emphasized the climatic hazards of farming in the Great Plains, a region renowned for livestock, grain, and other agricultural products. In response to the urgent needs of farmers and ranchers, the SCS early began developing methods of protecting the inherently fertile Plains soils from the effects of uncertain rainfall, strong winds, and wide variations in temperature. Stubble mulching—protecting the soil against wind and water erosion by using the straw as cover after harvest instead of burning it or plowing it under—is proving one of the most effective conservation practices evolved in this and other western areas.

Test plots and field trials, set up in cooperation with the University of Nebraska, showed that stubble mulching increased infiltration of water, improved the structure of the soil, reduced runoff of rain and melting snow water, slowed evaporation, and lessened erosion by wind and water. Next, the research workers faced the task of devising cultivation methods that would not disturb the mulch of crop residues. In 1938, soil conservationists attached flat, V-shaped sweeps to a modified one-row cultivator for early experiments with subsurface tillage that would stir the soil from beneath without turning under the protective stubble. Five years later, 8,000 commercially produced machines, operated on the same principle, were in use on 500,000 acres of war-crop producing Plains farms alone. For seedbed preparation,

scientists reversed the motion of a rotary hoe, changing its digging action to treading that would firm the soil and break up clods and straw without removing or piling up crop residues.

WATERSHED IMPROVEMENT AND FLOOD CONTROL

Department of Agriculture watershed-improvement activities in the interest of flood control, suspended during the war, are being resumed. Emphasis is being placed now upon completion of watershed surveys started before the war and upon installation of watershed treatment measures on 11 watersheds authorized for operations by the Flood Control Act of 1944.

The operations work is essentially a resource-conservation program that reduces flood and sedimentation damages. It consists of the installation of runoff retardation and erosion-prevention measures and practices by farmers and forest-land owners and the construction of sediment-impoundment structures and fire control and other improvements by individuals and local and other governmental agencies in accordance with plans developed on a subwatershed basis. The Department contributes to the work by furnishing technical guidance and assistance, supplies and materials such as seeds and plants, and seeding and sodding machinery and other construction and fire-control equipment.

The nature of the work varies in different parts of the country. On the watersheds of the Washita River in Oklahoma and the Trinity and Middle Colorado Rivers in Texas the principal job is to establish and maintain protective grass cover on range areas, to see that the cultivated lands are conservation-farmed, and to provide spreaders, contour furrows, and other facilities for retardation of runoff. On the Los Angeles River watershed it is to install channel-control measures, establish and maintain grass and shrub cover, and provide the facilities for making the area fireproof. On the Little Tallahatchie and Yazoo watersheds in Mississippi the job is primarily to see that the usable farm lands are conservation-farmed, that the eroded and worn-out lands are placed in stable public ownership and reforested, that the forests and ranges are protected from fire and properly managed, and that the roadsides are stabilized.

Similar and additional work such as installation of gully-control structures, retardation dams, stream-bank-stabilization measures, grassed waterways, diversion dikes and terraces, and debris basins are to be installed on the watersheds of the Little Sioux River in Iowa, the Coosa River in Georgia, the Santa Ynez River in California, Buffalo Creek in western New York, and the Potomac River in Virginia, West Virginia, Pennsylvania, and Maryland.

The approved program of work on each watershed is scheduled for completion in a specified period of from 10 to 24 years, with 20 years the most common period.

Legislative Basis for Flood Control

Department of Agriculture flood-control activities are carried out under the provisions of the Flood Control Act of 1936, as amended and

supplemented. The act also makes the War Department responsible for flood-control activities on rivers and other waterways. The two Departments work closely together to completely handle the Federal responsibilities for flood-control work in authorized drainage basins. They correlate their work with the interests of other Federal agencies, such as the Bureau of Reclamation in the west, and with State and local governments and agencies.

Congress has authorized preliminary examination and survey of over 600 watersheds or portions thereof. The Department has examined 124 that warrant further survey. It is planned to initiate survey work on various of these as means become available. As survey reports are completed, they will be submitted to the Congress as a basis for authorization of operations work on the watersheds, as on the 11 where work is now under way.

Survey reports describe the watersheds, their condition, flood history, and flood damages and outline remedial watershed programs and present estimates of their costs and benefits. They provide sound, carefully developed bases for watershed-improvement programs.

The watershed-improvement programs in the interest of flood control work with nature along established patterns of drainage to retard water runoff and reduce soil loss. They utilize well-managed forest, grass, and other vegetative cover and conservation-farming practices such as contour cultivation, strip cropping, and terraces, together with necessary mechanical measures, including detention dams, debris basins, and channel control structures, to provide complete programs on a subwatershed basis.

Planning of Watershed Treatments

Watershed-treatment measures for retardation of runoff and prevention of erosion in the interest of flood control must be planned by subwatersheds, for runoff and suspended sediment collects on that basis. Measures such as fire protection, detention dams, debris basins and stream-bank stabilization are installed on such a basis because of the nature of the improvements and because several farms or areas of nonfarm land are usually involved. However, many measures such as adjustments in use of land within farms, terraces, strip cropping and contour farming are installed on individual farms. Thus, the job of watershed treatment is one in which individuals, organizations, and local, State, and Federal units of Government are concerned and from which all derive flood-control and corollary resource-conservation benefits.

The watershed-investigation and operations work is carried on for the Department by the Forest Service and the Soil Conservation Service. Each Service is assigned responsibility for making preliminary examinations and surveys in a designated portion of the country. The facilities of both Services are utilized to carry out authorized operation activities in accordance with their functional specialties.

FOREST PROBLEMS AND SERVICES

The supply of timber products was short throughout the war. In the first postwar year also, shortages in many forest products were

acute. Lumber and plywood shortages greatly retarded progress of the Government's program to expedite housing construction. Distribution controls on lumber, removed immediately after VJ-day, were restored early in 1946 by the Civilian Production Administration, to give priorities assistance in housing for veterans. This meant less lumber for business and industrial construction and repair, for farm building, for shipping containers, and for many other needs. Pulp and paper were short.

Many factors contributed to the scarcity of forest products but a major cause was the plain fact that our supply of readily accessible, merchantable standing timber in the forests is running low.

National-Forest Timber

Importance of the national forests increases as total timber supplies decline. Hence, the Forest Service did all it could to help meet war needs, and timber sales from the national forests reached a record. Increased output for postwar needs will depend largely on construction of additional road facilities to open up stands now inaccessible.

Road construction in the national forests is now going forward. Funds appropriated by the Congress for this work have been supplemented by the National Housing Agency. Access-road construction is being given high priority in view of the critical lumber shortage. This program will open up new areas and make additional timber available for cutting under forest management practices which will utilize mature or overmature timber, improve forest growth, and provide for continuous production.

Some timber is also being obtained through commercial thinnings and improvement cuttings in immature stands. Such cuttings speed up growth and improve the quality of the timber left. Worthy of note is an increased output of poles for the rural electrification program and for private telephone, telegraph, and power-transmission lines.

Fire Control in the National Forests

The Forest Service fought 9,985 fires within national forest boundaries during 1945. Total area burned was 175,882 acres—less than one-tenth of 1 percent of the area protected. Burned area was nearly 60,000 acres less than the average for the preceding 5 years.

Generous assistance from military forces helped to offset handicaps caused by shortage of trained men in the regular fire-fighting organization. The Forest Service now faces the problem of replacing equipment kept in operation during the war years beyond its normal life and the problem of rebuilding a fire-control organization without the help it has had in receent years, first from the Civilian Conservation Corps and then from the Army.

Several developments are under way. "Smoke jumper" crews (fire fighters trained in parachute jumping) are being expanded in the Northwest. With the cooperation of the Army, experiments have tested the value of helicopters for moving men and equipment to fires in inaccessible areas. Plans have been made also for increased mechanization of fire fighting.

Recreation

In 1941, recreation areas in the national forests received 10¾ million visits. In many areas the recreation use since VJ-day has been at rates exceeding those of 1941. Undoubtedly recreational use will continue at a high level.

Prior to the war the Forest Service had constructed 4,300 camp and picnic areas, 254 winter-sports areas, 201 swimming areas, and 54 "organization camps" (permanent camps available to civic and welfare organizations for group outings at low cost). Even this large development has been inadequate. Maintenance work was largely suspended during the war, and there is now a tremendous job of restoring recreation areas to safe and sanitary condition. With special funds appropriated in 1946, a vigorous start was made on this job.

Range Management

National forest ranges helped in the wartime to meet needs for meat and meat products, wool and hides. With the cooperation of users, with progressive improvement, and with management for a sustained yield, they can help to support a permanent prosperous livestock industry.

More than 80 million acres within the national forests are suitable for livestock grazing. In 1946, permits were issued to 30,330 owners to graze 1,290,332 cattle and horses and 3,896,258 sheep and goats. Successful operation of 26½ million acres of ranch properties, whose investment is around $330,000,000 depends largely on part-time grazing in national forests.

During World War I, the ranges were stocked beyond capacity in the mistaken notion that increased numbers of livestock meant increased meat production. The mistake was not repeated in World War II. The Forest Service and leaders in the livestock industry encouraged streamlined production through close culling, improved breeding, prompt marketing, and all-around good animal husbandry and management. Increased stocking generally was avoided.

Large areas of national forest range are now in good shape, and prospects are good for keeping them that way. Many national forest ranges, however, have not recovered from past misuse. Recurrent and prolonged droughts have caused further deterioration in some areas. Some 26 million acres need corrective action, such as better handling of the livestock, more fences and water developments, range reseeding, or adjustments in seasons of use and in numbers of animals.

Special emphasis is being given to improve range management plans. Permittees in many cases voluntarily keep their livestock off the range for a period sufficient to let forage recover. Range reseeding will restore depleted ranges and increase grazing capacity.

Applications for renewal of 10-year term permits have been approved in every case where the holder is qualified and range is available. Thus every permittee whose range is properly stocked enters the new term period—1946 to 1955—with maximum assurance of undisturbed use during the next 10 years.

National-Forest Development

Some additions to the national forests were made through land exchanges during the war years, but land purchases for national forest purposes under the Weeks law of 1911 and the Clarke-McNary law of 1924 were suspended. The Congress has appropriated $3,000,000 for purchase of lands in the fiscal year 1947, and this activity will be resumed. High priority will be given to the purchase of lands within existing national forest boundaries. Many national forests contain numerous scattered tracts of privately owned nonagricultural lands, which complicate public-forest administration.

In certain other areas problems of forest restoration, watershed protection, or other considerations make public ownership desirable.

Much land that might be acquired for national forest purposes now pays little in the way of taxes; yet local governments are often reluctant to see it taken off their tax rolls. Under present laws, the Federal Government pays 25 percent of the receipts from the national forests to the States for distribution to local governments. Different national forests vary widely in receipts from year to year, however, and denuded lands newly acquired bring in few receipts during the long period of restoration.

Some method is needed that will put the Federal financial contributions to local governments on a more stable and equitable basis, fair both to the local units where the lands are situated and to the Federal Government, which must bear the burden of land rehabilitation and management.

Much improvement and development work is needed to realize the full value of our national forests under multiple-use management. With a full development, their total sustained-yield output of timber can eventually be doubled. Reseeding and other improvements can greatly increase the carrying capacity of national forest range lands. More facilities are needed to take care of recreationists. Upstream work is needed to conserve water supplies and reduce floods.

Within the national forests some 2,200,000 acres of deforested land require planting. An additional 1,000,000 acres are understocked and need "fill in" planting. Planting on national forest lands was largely suspended during the war, but the Forest Service's 21 tree nurseries are now being put back into production. Funds available for fiscal year 1947, however, will only permit planting 27,600 acres.

Cooperation With the States and With Private Owners

Under the Clarke-McNary law, the Forest Service cooperates with the States in protecting State and private forest lands from fire. Federal allotments are contingent upon the provision by States and private owners of an amount at least equal to the Federal funds. Actually, most States contribute more than the Federal Government.

Cooperative protection has so far been extended to 303 million of the 439 million acres of State and private forest land that needs protection. On some 136 million acres organized fire control has not been

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started. In 1945 less than 1 percent of the total protected area burned over, as compared with nearly 12 percent on the unprotected areas. The bulk of the area without protection is in the Southern States.

The Timber Production War Project, initiated in 1943 to stimulate increased output of timber products for war needs, was terminated on October 31, 1945. Operated in all major forest regions east of the Great Plains, the project in a little more than 2 years assisted operators—especially small mill operators—to produce an additional 8 billion board feet of needed forest products. The cost of the project averaged 65 cents per thousand feet produced. Half of the cost represented the value of services contributed to the project by cooperating agencies, especially the State forestry services.

To provide technical advice and assistance to farm woodland owners in forest management and marketing of timber products, the Forest Service, in coperation with the States, has 156 farm woodland-management projects under way in some 600 counties. These projects include 45 farm-forestry demonstration projects formerly under the Soil Conservation Service. Since July 1945, the responsibility for administration of the cooperative farm-forestry program authorized by the Norris-Doxey and Clarke-McNary Acts has been consolidated in the Forest Service as the Department's principal forestry agency.

In each project a trained forester works with individual land owners on plans for woodland management and marketing. These foresters, although spread thin over 600 counties, help many a farmer to realize better returns from his timber and at the same time to keep his woodland in better productive condition. Such direct, on-the-ground service should be extended to 3½ million farm woodland owners in more than 2,000 forest counties, and to almost a million small nonfarm owners of forest land who thus far have received little help.

During fiscal 1946, the Forest Service cooperated with 42 States and two territories in the production of forest tree planting stock for distribution to farmers. A total of 37,343,000 trees were distributed at low cost. Millions of acres of idle submarginal farm land and nonproductive farm woodland need planting. Making planting stock available to farmers at low cost under this cooperative program helps materially in putting these lands to work. But Federal cooperation in tree distribution should be broadened to include distribution to nonfarm owners of forest land as well as farmers.

Privately owned forest land will have to grow most of our national timber supply. And small forest land owners predominate. There are less than 3,600 owners with holdings of over 5,000 acres of land, but more than 4 million small owners with less than 5,000 acres each. The small ownerships are generally in the least productive condition.

Research in Wood Utilization

Representatives of important wood-producing regions met in March 1946 to exchange information on forest-product research. The conference clarified the scope of existing research facilities and projects and inquired into research needs of various States and regions.

It will be necessary to utilize fully all satisfactory new materials if national housing goals are to be met. At the request of the National Housing Agency, the Forest Products Laboratory at Madison, Wis.,

is testing new materials and helping to determine their suitability for housing.

To help increase the supply of properly dried lumber for housing, the Forest Service is giving instruction in kiln-drying methods at industrial centers and at the Forest Products Laboratory. It is making information on glues and gluing in prefabricated house construction available to manufacturers. It has published information on increasing fire safety in houses.

The Laboratory has devised methods for applying radio-frequency heating to the setting of glues in wood products. It has demonstrated that high-frequency dielectric heating can be employed advantageously in the mass production of articles which require the use of expensive jigs and other apparatus. The rapidity with which the glue is set—in seconds rather than hours—enables manufacturers to use such apparatus at a much faster rate, and thus to cut their unit costs. High-frequency heat appears to hold special promise in furniture manufacturing and in the production of laminated timbers for structural purposes and shipbuilding.

A process has been developed by which alpha cellulose can be produced from wood in greater quantity per unit of raw wood and in purer form than is possible by present pulping methods. Wood cellulose goes into such diverse products as sausage casings and rayon for truck tires.

The use of test papers has been developed by the Laboratory for the detection of sulpha drugs in human beings. It is being employed by the United States Public Health Service.

Forest and Range Management Research

At the Crossett Experimental Forest in Arkansas, the Forest Service since 1937 has kept records on a 40-acre tract managed as a farm woodland. Stumpage value of products removed has averaged $3.99 per acre per year, and under careful cutting practice the growing stock has been gradually increased. The experimental work on the "farm forty" develops practical applications of good forestry practice.

Experiments at the Lakes States Forest Experiment Station show that thinnings can increase the pulpwood yields of jack pine stands as much as 20 to 25 cords per acre in the first 50 years of the stand's life. If even half of this increase could be realized throughout the jack pine areas in the Lake States, the prewar cut of pulpwood in that region could be maintained in perpetuity.

At the Institute of Forest Genetics, a branch of the California Forest and Range Experiment Station, hybrid pines have been developed which show more rapid growth than one or both of the parents. If seed can be obtained from these hybrids, new stock will be raised for extensive trial.

Cattle- and sheep-grazing studies on experimental ranges in various sections of the West have demonstrated the value of conservative range stocking. In Colorado, yearling Hereford steers grazed for a 5-month period at the rate of 43 head per section, on good pine-bunchgrass range, gained 32 percent more than similar cattle grazed at the rate of 56 head per section. Net income under conservative grazing was $1,215 per section, against only $919 per section under heavy grazing.

Research has guided economical reseeding of depleted range land in the Intermountain and Northern Rocky Mountain regions. Last year more than half a million acres of depleted range in Utah and southern Idaho were reseeded in accordance with procedures developed by research. This will provide for carrying approximately 214,000 cattle or 892,000 sheep through the critical spring period. Only one-tenth of this number could satisfactorily be carried before the reseeding. Large acreages were also successfully reseeded in Montana at costs ranging from $1.25 to $3.50 per acre. Small-scale seedings by airplane were successful.

World Forestry Organization

The Forest Service is giving wholehearted support to the Branch of Forestry and Forest Products of the United Nations Food and Agriculture Organization. The Chief of the Forest Service headed the American forestry delegation to the International Conference on Food and Agriculture in Quebec, Canada, in October 1945. This conference prepared the way for setting up the permanent Forestry Branch as a first move to deal with a growing world shortage of timber that is a threat to world reconstruction.

The Forest Situation in the United States

A reappraisal of the Nation's forest resources indicated we have entered a period of reduced timber supply that will last many years.

As of 1945, the total stand of saw timber in the United States was estimated at 1,601 billion board feet. An estimate by the Bureau of Corporations in 1909 placed the total saw-timber stand at 2,826 billion board feet; in 1938 the Forest Service placed the total saw-timber volume at 1,763 billion board feet. These estimates are not directly comparable; yet it is clear our forest capital has gone down. The indicated reduction is at the rate of 1¼ percent a year.

Moreover our timber resource has declined in quality. High-grade trees of the kind needed for many specialty uses, or of a size that will make heavy structural timbers or wide clear boards, are far from plentiful throughout the East, Central and Lake States, and the South. The average size of logs delivered to sawmills has generally declined. Inferior species of scrub growth have taken over large areas. Even in the far West, where competition is increasing between plywood manufacturers and lumber mills for Douglas fir logs of "peeler" grade, a decline in amount of quality timber is beginning to be felt.

Yearly drain of saw timber from our forests (annual cut for lumber, pulpwood, and other products, plus losses from fire, wind, insects, and diseases) is at the rate of 53.9 billion board feet. Annual growth is only 35.3 billion board feet. Saw timber drain thus exceeds growth by more than 50 percent. Ninety percent of the total drain comes from cutting lumber for use.

The problem is to increase our annual growth of timber for the long pull, and do so as far as possible without reducing output of forest products for immediate needs. Forest growth must be built up in the East. While eastern growing stocks recover, we shall have to draw

heavily on the West, where practically all the remaining virgin timber stands are located. By careful planning and management we must maintain productivity in the western forests. Growth in the western forests may be increased by selective cutting and by protection of the second growth from premature stripping. But even with the best of forestry and conservation we face a long period of restricted supply.

Since our national forests and other forest lands in public ownership (Federal, State, and community) include only about 25 percent of the country's total area capable of growing commercial timber crops, we must look to private forests for the bulk of our timber supplies. Present cutting practice on far too much private forest lands is still of the type that results in progressive deterioration of the forest. On only 8 percent of all private forest land can present cutting practice be called good.

Many large industrial operators are now using good cutting practice. But corporate and other large ownerships represent only 15 percent of the total commercial forest acreage in private ownership. On the much greater area in small ownerships poor cutting practice is general.

Positive measures will be required to grow needed timber, such as protection against fires, insects, and diseases; extensive planting on millions of acres of depleted forest land; reduction of waste; putting a stop to destructive practices; and encouraging wider adoption of good forest management.

Water Repellents for Lumber and Plywood

The Forest Products Laboratory has brought a basis for standardization to the field of water repellents for lumber and plywood. This has been achieved by establishing suitable methods by testing water-repellent preservations on which specifications can be based, by developing formulas for satisfactory water-repellent preservatives, and by clarifying nomenclatures and definitions that differentiate water-repellent preservatives from preservative wood sealers.

Water-repellent preservatives give wood moderate protection from rapid changes in moisture content and from attack by blue stain and decay fungi without inconvenient or expensive methods of treatment. During the war, these preservatives were widely used on wood boats and ships, wood truck bodies, container plywood for overseas shipment, and hutments for overseas use. Many peacetime uses are anticipated in a variety of wood products, such as doors, window sash, and some furniture, where water-repellent preservatives afford adequate protection.

DAIRY CATTLE BREEDING AND FEEDING

Long-time breeding experiments with dairy cattle at the Beltsville, Md., dairy station continue to show the importance of using proved sires or the sons of proved sires for herd-improvement purposes.

In a Holstein herd whose foundation cows had an average butterfat production of 678 pounds per cow per year the use of proved sires continuously since 1919 has increased the average to 892 pounds per

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cow. In a Jersey herd whose foundation cows had an average butterfat production of 622 pounds per cow per year the use of proved sires since 1919 has increased the herd average to 829 pounds per cow. These records are made on three milkings a day for 365 days and are calculated to a mature-animal basis.

From these experiments, and also from experiments in mating proved sires to related as well as unrelated females in the Jersey herd, the Bureau of Dairy Industry concludes that the use of proved sires is the determining factor in production improvement rather than the system of mating. In other words, the quality of the sires is the important factor, rather than the family relationship of the animal.

The accumulation of good germ plasm in the experimental herds shows up in high-production records. Three of the Holstein cows each produced during the past year more than 1,000 pounds of butterfat on three milkings a day. Seven cows in this herd exceeded the 1,000-pound mark within the last 5 years. Two cows exceeded the 1,000-pound mark for a second time. This is convincing evidence that proved-sire breeding is effective; only 61 cows in all Holstein history have produced as much as 1,000 pounds of butterfat in 1 year on three milkings a day.

In addition to the three 1,000-pound records made in the herd the past year, one other cow made 900 pounds and seven others each made over 800 pounds. Four of these cows were under 4 years of age.

Bulls bred in the experimental herds at Beltsville and at field stations contribute good germ plasm to the improvement of the Nation's dairy cattle. In the last 3 years 50 Beltsville-bred bulls and 6 bulls bred at the other stations have been loaned for service in artificial-breeding associations. They will sire nearly 20,000 calves this year.

The kind of germ plasm that farmers can expect by cooperating with the Bureau in using and proving young bulls from the experimental herds is indicated by the results obtained with 332 bulls that were loaned from 7 of the Bureau's field-station herds. These 332 bulls sired 4,619 daughters with a mature-equivalent average production in a year of 10,914 pounds of milk and 426 pounds of butterfat. Most of them were tested in farm herds under Dairy Herd Improvement Associations rules. These daughters averaged 690 pounds more milk and 30 pounds more butterfat a year than their dams.

Feeding and Management Studies

Experiments at the field station at Huntley, Mont., resulted in better milk yields from cows in pen barns than from cows in conventional stanchion barns. On a liberal grain ration cows averaged 18,402 pounds of milk and 684 pounds of butterfat (records calculated to maturity) when housed in the pen barn, or 19 percent more milk and 18 percent more butterfat than they produced when housed in the stanchion barn. On a limited grain ration cows averaged 14,319 pounds of milk and 501 pounds of butterfat in the pen barn, or 8 and 6 percent more milk and butterfat, respectively, than they produced in the stanchion barn. The cows were more comfortable in the pen barn; this fact is considered the probable reason for the better yields.

Cooperative experiments by the Bureau of Dairy Industry and the Bureau of Plant Industry, Soils, and Agricultural Engineering at Beltsville indicated the advantage of preserving the alfalfa crop in the

silo. Making silage saved about 9 percent more dry matter and 14 percent more protein per acre than curing the crop in the field. Cows produced 3 percent more milk per unit of dry matter on the silage than on the hay. The feed nutrients saved by putting the crop in the silo together with the better milk yield resulted in 16 percent more milk per acre from preserving the crop as silage instead of as field-cured hay.

After several years of research to determine the nutritional requirements of dairy calves, the Bureau of Dairy Industry has devised methods by which calves can be raised without getting any salable whole milk and only a very little skim milk. By proper feeding, Holstein calves can be weaned from all milk at 45 days of age and Jerseys at 60 days. Under certain economic conditions this method of rearing calves would be desirable as a means of marketing greater quantities of milk. It calls for giving the calf the mother's colostrum milk for 3 days and then feeding skim milk in moderate amounts (1 pound for each 10 pounds of body weight daily) for 45 to 60 days. Good-quality hay is fed as soon as the calf will eat it, and the skim milk is supplemented with cod-liver oil to furnish the needed vitamin A until the calf is eating enough carotene in the hay to meet its requirements for vitamin A. Various energy-rich feeds, such as corn meal, flaxseed jelly, or a good concentrate mixture, may be mixed with the skim milk after the calves are 5 to 12 days old to increase growth and gains during the first month or so.

Use of Thyroprotein

Various investigators have reported increases of 20 to 30 percent in milk production by feeding the synthetic drug thyroprotein to dairy cows. However, restrictions have been placed by Federal Trade Commission on the use of the drug until more information is available concerning its effect on the health of the cow and on her future production and reproduction. Feeding experiments by the Bureau of Dairy Industry showed that cows that were fed the drug produced more milk for a time but lost considerable weight and then began to decline in production more rapidly than a control group. In order to reduce the rapid decline it was necessary to feed 25 percent more nutrients with the drug. But when the extra nutrients were fed there was a marked increase in heart rate, which indicated that the cows were being forced to work harder than normally. Further investigation will be needed to determine whether the extra production will pay for the extra feed required and whether use of the drug will seriously impair the cow's usefulness.

EXTENSION WORK

The Extension Service of the Department stressed the reasons for continued all-out farm production and provided farmers with technological and other information. Enlarged in staff in accordance with the Bankhead-Flannagan Act, passed in June 1945 to provide for further extension work, the Extension Service operated on an expanded basis throughout the year. The legislation called particularly for expansion of county extension work, and for extension programs to

reach a larger number of boys and girls and older youth. Under the act and the related appropriations, an increase of $4,500,000 in Federal funds went for extension work during the fiscal year 1946. The corresponding amount for the fiscal year 1947 will be $8,500,000. For subsequent years it will be $12,500,000. The States increased their share of the cost during 1946 by $1,800,000 from sources within the States.

Through the greater financial support given in the Bankhead-Flannagan Act, the Extension Service added 1,566 professional workers to its rolls between July 1, 1945, and June 30, 1946. All but 100 were county extension workers. The new county workers included 90 white and 67 Negro agricultural agents, 128 white and 84 Negro home demonstration agents, 1,041 4–H Club agents and assistant agricultural and assistant home demonstration agents, and 45 food assistants. Activities of these new workers followed suggestions and directions for using Bankhead-Flannagan funds as brought out in hearings and reports of Congressional committees. Particular obligations include expansion of 4–H Club work with rural boys and girls. The thousand and more new assistant agents and 4–H Club agents will specially emphasize this work.

Stimulated by realization that atomic energy, hormone sprays, and many other wartime developments in science will affect every farm and every farm family, the Extension Service conducted information programs about these things.

An outstanding development was a report by a committee on Extension's educational responsibility. Composed of Federal extension workers, the committee outlined principal bases for the Extension Service's activities, appraised current activities, and considered needs for additional ones. It especially recommended increased emphasis on: (1) Economic problems and public policies (2) marketing and distribution; (3) certain segments of the field of social relations, adjustments, and cultural values; (4) farm homes and buildings; and (5) health. It recommended a moderate increase in Extension Education on (1) conservation of natural resources, (2) farm and home management, (3) and rural organization and leadership development. Less increase was considered needed in the field of production techniques, traditionally emphasized in Extension work.

Economizing Farm Manpower

Through its emergency farm-labor program, which the Congress has ordered continued to June 30, 1947, the Extension Service placed between 2 and 3 million workers on farms to help plow, harrow, seed, cultivate, dust, spray, feed, milk, and harvest. More than a quarter of a million women and girls over 18 and more than a half million boys and girls in the Victory Farm Volunteers responded to calls for farm help. Foreign workers were again brought in to help with the picking of fruits and vegetables. As usual, most of the hired farm work was done by full-time American men, and the Extension Service recruited and placed many of them.

Extension workers helped farmers plan and arrange farm operations so as to save time and effort. Shortage of farm machinery continued to hamper farmers. Extension programs distributed information on elimination of unnecessary practices, the use of labor-saving

devices, the adoption of new working methods, the proper training of workers, the pooling of labor and equipment, the expansion of custom work, and other practices for stretching manpower.

In the famine emergency, Extension activities included meetings, personal contacts, farm demonstrations, radio broadcasts, and newspaper and magazine writing. Farmers learned the emergency reasons for increased deliveries of wheat, sparing use of feed, culling of poultry, improvement of pastures, and other means of conserving grain and making it available at seaports.

Aiding People in Rural Communities

The Extension Service helped 5 million farm families and 2½ million families who do not live on farms but are for the most part located on country roads, in crossroads hamlets, and in larger rural communities. To reach these people, Extension's 10,500 professional workers made 3½ million farm and home visits, wrote more than 700,000 news stories, made 42,000 radio broadcasts, and distributed 20 million copies of bulletins. They held meetings, tours, demonstrations, and other events which attracted 36 million people. In their offices they advised 10 million rural people who came in to get help.

The information given out by the Extension Service covered a wide range of farming and homemaking subjects and extended into many other fields of rural people's interests and needs. Farmers learned how to use DDT, how to milk their cows the modern 4-minute way, how to cut corners in doing their chores. They received information on current prices and economic trends, and on making out their income tax reports. Veterans received advice on land values, opportunities in agriculture, and how to pick out a farm. Girls learned to sew, cook, can, select a wardrobe, and perform other homemaking tasks. Boys learned how to raise livestock and gardens, how to electrify the farm and home, how to plan farm operations. Feeding the family for health, budgeting with the family group, home furnishing and decorating, and other topics entered into the Extension program.

Extension Aids to Club Members

More than a million of the 3½ million women who benefited from Extension's teachings were members of Extension homemakers' clubs. More than 1½ million boys and girls were members of 4-H Clubs. These women's and children's organizations, aided by other extension activities, developed leadership, promoted group recreation, and encouraged discussion of many problems, and gave rural people a chance to take part in educational field days, camps, achievement meetings, special activities at fairs, demonstrations, exhibits, and tours.

About a million farmers, rural women, older boys and girls, and others from practically all walks of rural life helped to lead extension clubs and work projects, inform their neighbors of new developments and methods, and do other extension tasks. These civic-minded local leaders were simultaneously volunteer extension workers and products of Extension work, now nearly half a century old.

Special activities and occasions which receive support from the Extension Service during the year included fat salvage, the collection of clothing for distressed people overseas, victory gardens, National

Home Food Preservation Week, National Fire-Prevention Week, Spring Clean-up Week, Farm Safety Week, National 4–H Club Week, and National Home Demonstration Week.

Repairs and new construction on farms have been extensively postponed for more than a decade. In the 1930's lack of money was a principal cause; in the war years, lack of materials, labor, and time. As a result, the rural housing situation is critical. The Extension Service is endeavoring to alleviate it by answering requests for information on farm and home building and remodeling, holding meetings and demonstrations, issuing publications, and promoting other activities. The call for this service is increasing.

Training and professional improvement of extension personnel got a new start during the year after the wartime interruption. About 300 Extension workers attended summer classes at 9 universities. The classes were arranged, planned, and taught with the cooperation of the Extension Service. Other extension workers attended training schools, conferences, and workshops held in a number of States.

PROGRESS OF FARM SECURITY OPERATIONS

Demand for Farm Security Administration operating loans during 1945-46, including adjustment loans to enable veterans and displaced war workers to return to the farm, exhausted the funds available in most parts of the country by February. However, a supplemental loan authorization of 15 million dollars was provided by Congress on March 28. More than 313,000 small farmers, including 20,000 veterans of World War II, used the supervised-credit services of the Farm Security Administration in the 1946 fiscal year.

Services provided for in the Servicemen's Readjustment Act of 1944 gave FSA widespread recognition as an aid to farmer-veterans of World War II. Veterans with farm experience were made eligible for the benefits of the Bankhead-Jones Farm Tenant Act to the same extent as were farm tenants. Half of the 50 million dollar loan authorization for farm purchases was earmarked for veterans. The program provided a long repayment period, low interest rates, and a variable payment plan based upon farm income, instead of a fixed annual charge. The entire purchase price of the farm and the cost of necessary improvements of land and buildings could be obtained with one loan for operating essentials.

Farm-adjustment loans under the rehabilitation program offered individual on-the-farm guidance to veterans, who were thus able to obtain practical advice regarding land and equipment needed to start farming, and about the prices they could afford to pay.

A total of 17,141 veterans obtained $41,000,000 in loans during 1946. This total comprised 15,229 veterans who obtained funds for farm and home operating expenses and 1,912 who were helped to purchase farms of their own.

Types of FSA Service

The Farm Security Administration made three types of supervised loans: Rural rehabilitation or farm-adjustment loans, for the purchase of seed, feed, livestock, and farm equipment; farm-ownership loans, for the purchase of family-type farms; and water-facilities loans, for the

installation or repair of various water facilities such as ponds, irrigation systems, and deep-driven wells.

The rural rehabilitation program supplied small farmers who could not obtain adequate credit elsewhere with financial assistance and individual guidance. Better tenure arrangements, sound planning, and improvements in farm and home management helped such farmers and their families toward greater security and production.

During 1946 a total of 207,491 families participated in the rehabilitation program; 33,555 were new borrowers. The average loan to new borrowers was $1,323.

Emphasis increased on sound farm and home plans developed by the borrower with FSA assistance. Such plans showed intended enterprises, estimated costs of the year's operations, the income to be expected, the improvements to be made in farm and home management practices, the amount of credit needed, and the amount likely to be available for debt repayment at the end of the year. They served also as a practical chart for improvement within family resources and capabilities, and provided FSA with a basis for lending, supervising, and collecting activities.

Before a rehabilitation loan is approved, the borrower must make satisfactory tenure arrangements for an adequate farm unit. Leasing must be fair to both landlord and tenant. Long-term written leases promote better understanding between the landlord and the tenant, and FSA encourages the use of such leases.

FSA home economists assisted homemakers with canning, food storage, meal planning, and gardening, and also with sewing, kitchen improvements, everyday health practices, home safety, and sanitation. Facilities of State agencies were available through cooperative arrangement.

Borrowers were encouraged to join with neighbors in acquiring and using heavy machinery, better herd sires, and services too expensive for the individual. Groups of FSA borrowers and their neighbors bought such items as disks, combines, and food-preservation equipment. Such groups average four to five members.

A heavy demand for water-facilities loans during 1946 necessitated a supplemental appropriation. This service, confined to 17 Western States, provides farmers individually or in groups with loans and technical assistance to repair or install facilities for farmstead and irrigation water. In many western areas water facilities are one of the most successful aids to farm rehabilitation or adjustment. Farmers who have them usually can make full use of their owned or rented land.

Borrowers receive engineering aid. They have up to 20 years to repay their loans, depending on the useful life of the facilities; the interest rate is 3 percent. During the fiscal year 1946, loans were made to 1,084 families not previously reached by the water-facilities program. Amounts averaged $804 per family. Collections in the same period were approximately $700,000.

Many farm families who first came to Farm Security for rehabilitation loans and services have since qualified for farm-ownership loans. They have built up their resources, acquired enough livestock and operating equipment, and gained experience. These and other farm-ownership borrowers receive the same technical and advisory help from county supervisors and committees as do rehabilitation borrowers.

Loans were approved in the fiscal year 1946 for 3,042 applicants who were able to find adequate farms for sale at prices in line with long-time earning capacity values. In many counties, however, farms capable of providing an income sufficient to support a family and repay the purchase loan could not be bought within the price limitations. The law requires an allocation of the available funds according to farm population and prevalence of tenancy. Hence money unused in some States could not be transferred to other States where farms were available at approvable prices except in the case of funds earmarked in the special authorization for World War II veterans.

Good housing, always a basic principle of FSA's farm-ownership program, received attention. All FSA loans for farm purchases include funds for necessary construction or repair to reach minimum acceptable standards. During the war, when materials were limited, it was not possible to do the required construction or repair work in all cases. But funds for this purpose were set aside and will be used as soon as materials and labor are available.

Costs of housing construction and improvements are reduced wherever possible by using the farm family's labor and local building materials. Minimum FSA standards for housing require screens on windows and doors, secure chimneys, good foundations and floors, safe steps and railed stairways, adequate sleeping rooms, and separate kitchens equipped with sink, cupboard, drawers, and work space. Space must be provided also for food storage, for clothing and tool closets, and for sanitary toilets.

Illness or disability in the farm home or unexpected hospital and doctor's bills can hinder progress in rural rehabilitation or even cause failure. Hence the FSA program includes health services.

FSA helps borrowers to organize local associations through which they can obtain medical and dental care at a cost within their means. Members prepay annual fees into a pooled fund. The first groups of this kind were begun in 1936, with the cooperation of State and local medical societies. Membership was voluntary; members had free choice of participating physicians and dentists. At the outbreak of the war, more than 1,000 counties had such associations, many of which offered dental care and hospitalization, as well as physicians' services.

Most of these groups continued through the war, despite the serious rural shortage of doctors and dentists; and Farm Security has maintained an active program to protect borrowers' health. Main objectives are: (1) To assist groups in obtaining essential medical and dental care and hospitalization for emergency cases, particularly in areas where physicians are available for office and home care; (2) to consolidate single-county health plans into multicounty or State-wide plans; (3) to expand, where necessary to assure their continuance, existing health service plans to include non-FSA rural families needing such services; (4) to make full use of all health resources of the community; and (5) to develop a better understanding of good health practices by individual families.

County Committees

County FSA committees consisting of three local farmers give attention to local agricultural problems. Such committees during the year

assisted veterans. Committeemen certify applicants' eligibility for loans, and keep in touch with borrowers' progress. They review the record of all families who have been on the FSA program three crop years or longer, and recommend whether these families should continue as FSA borrowers, be "graduated" to private credit, or receive no further aid. In the farm-ownership program they see that each farm purchased is an adequate family-type unit, and that the purchase price corresponds with what the farm may be expected to earn over a period of years.

RESEARCH AT STATE AGRICULTURAL EXPERIMENT STATIONS

The Kansas station has estimated benefits of a cooperative cereal-breeding program started 15 years ago. Outstanding varieties developed by this program are Comanche and Pawnee wheat and Osage and Neosho oats. Possessing greater resistance to diseases and to insect pests and having other improved qualities, they outyield older varieties, which are rapidly being replaced.

For example, Pawnee wheat, grown on 40,000 acres in 1945, yielded an estimated 135,000 bushels over what standard wheats grown in Kansas on that acreage would have produced. The increase was worth $200,000. Comanche wheat was grown on 20,000 acres in 1945 and gave an increased value of $40,000. In 1949 the station expects Pawnee to be grown on 55 percent of the State wheat acreage and Comanche on 15 percent. The expected increase in the State's farm income from these varieties in that year, assuming no change in prices, is estimated at $27,000,000 for Pawnee and $3,000,000 for Comanche.

Osage and Neosho oats, together with Boone, Tama, and Cedar oats, developed in Iowa with USDA cooperation, gave a return in Kansas in 1945 estimated at $1,700,000 over the standard oat varieties formerly grown there. It is expected the new varieties will occupy 95 percent of the Kansas oat acreage in 1949; if so, the increased return at current prices would be $4,500,000.

At the New York Cornell station, experiments with a flame cultivator killed practically all weeds in corn without injuring the corn crop. The flaming was done when the corn was several inches taller than the weeds. On the other hand, it was difficult to kill even small weeds without serious damage to spinach. Results with green beans, soybeans, peas, and cabbage ranged between those obtained with corn and spinach. The experiments tended to uphold the claim that when the first weed crop has been killed by flame cultivation, there will be no more weeds for the season. Flame cultivation does not disturb the soil and consequently does not bring more weed seeds up into the germination zone.

Montana Crested Wheatgrass

The Montana station estimates that the seeding of crested wheatgrass on some 1 million acres of abandoned cropland in the State has added about $2,000,000 to the income of livestock operators. This winter-hardy, drought-resistant forage crop from the Siberian plains was made available to Montana livestock growers a little more than

two decades ago, through the cooperation of the station and the Department. In dry-land pasture experiments it has produced an average of 78½ pounds of beef per acre per grazing season, or about 42 pounds more beef per acre than the amount produced on good native pasture. At a long-time average price of beef of 6 cents per pound, the beef produced on the crested wheatgrass was worth $2.50 more per acre than that produced on native pasture. The acceptance of crested wheatgrass by livestock growers and its widespread use in Montana stem from this research.

A sweetpotato-breeding program at the Louisiana station resulted in the development of improved varieties and high-quality seed stock. These enabled the State to produce over 10 million pounds of dehydrated sweetpotatoes for the Army and Allied agencies in 1945, and to supply certified seed for in-State use and for carlot shipments to other States. Carlot movement of potatoes, which began in 1941, totaled 8,000 cars in 1945. Five new feed-dehydration plants were built in 1945 and more were under construction in 1946. Ten or more factories can sweetpotatoes. Among the new varieties bred by the station are Pelican Processor, which analyzes 26 to 36 percent of starch, and a number of high-carotene seedlings for table use and dehydration. Three of the latter have twice the carotene content of the standard Porto Rico variety.

Research at the Missouri experiment station in the improvement and development of pasture land has led to an increase in the pasture season under average Missouri conditions. It is now 7½ months, as compared with 6 months formerly. This extension of 1½ months has resulted in the production of additional feed from pastures equivalent to approximately 37 million bushels of corn, or nearly one-fourth of the average corn crop of the State. The total feed production by pasture land in Missouri now exceeds the production of corn by the equivalent of 31 million bushels; total production from pasture is equivalent to 184 million bushels of corn; when corn is worth 50 cents per bushel, the annual benefit to Missouri farmers from this pasture-improvement program amounts to almost 30 million dollars.

Effect of DDT on Bees

Widespread interest in the use of DDT as an insecticide has presented a question as to its harmful effect on bees, which are essential for the pollination of many crops, as well as for the production of honey. In recent experimental applications of DDT on alfalfa in bloom the California station found that bees were either killed or driven from the field for the first 2 days. There was, however, no serious reduction in the strength of the majority of the colonies near the treated fields, and the station found that DDT was not as injurious to bees as arsenicals applied under similar conditions.

Similar results followed the application of DDT to cotton, nectarines, onions, and carrots. No injury to colonies of bees was apparent when DDT was used in mosquito-control work.

Trace Elements in Soils

The Florida station, in reviewing research on trace elements in soils, noted that extensive production of vegetables in the Everglades

would not be possible without the use of these materials. Wide use of them to keep citrus groves thrifty has greatly increased the quality and value of citrus fruit and enhanced the tolerance of citrus trees to cold. Research in trace elements, begun about 10 years ago, has increased Florida's annual production of citrus fruit by some 30,000,000 additional boxes. About 60 percent of the beans, 24 of the cabbage, 35 of the celery, 80 of the peas, and 18 of the peppers grown in Florida are produced now in one county, which 20 years ago because of trace-element deficiencies harvested very little.

Trace elements are applied to the soil in relatively small amounts from about 10 pounds of boron per acre to 40 or 50 pounds of manganese and copper. Figures on their use for agricultural purposes in Florida show how extensively the research findings have been applied. During a 12-month period Florida farmers used some borax, about 3⅓ million pounds of zinc sulfate, about 19 million pounds of copper sulfate, nearly 23 million pounds of manganese sulfate, and large quantities of magnesium. About 70 percent of all the manganese used for agricultural purposes in the United States is used in Florida.

POSTWAR PERSONNEL PROBLEMS

The end of the war brought to the Office of Personnel many problems in connection with the employment of veterans. During the war the Department had 18,265 employees in the military services. In 1946 approximately 10,000 had been restored to their jobs or to jobs of similar or better pay, seniority and status. Throughout the year the Department operated an on-the-job training program for veterans as well as other training programs to assist them in adjusting themselves once more to civilian life. A Veterans' Departmental Advisory Committee with representatives on it from all the Department's bureaus was established and cooperated with the Office of Personnel in readjusting personnel plans, policy and regulations. Since World War II veterans have become available for employment, a total of 14,122 who had not previously been in the Department have obtained Department jobs.

In general, the Office of Personnel strengthened its program for providing Department-wide coordination and guidance in personnel administration. This program included further delegation of employment and classification authority to personnel officials in the bureaus, along with an improved Department-wide program for reviewing personnel procedure. In December 1945 administrators, personnel officials and other key officials attended a 5-day meeting to consider methods of facilitating personnel administration, and offered 116 recommendations, most of which have been put into effect.

Notable in the year's personnel administrative work was an organized effort to increase the utilization of employees' skills. A joint committee representing the Office of Budget and Finance and the Office of Personnel encouraged this development which included the training of supervisors and the more general use of good methods for improving employees' relations. Another program, recommended by the Bureau of the Budget, went into methods of work simplification. This program, according to representatives from Bureau Chiefs, greatly improved the work of several bureaus. The program secured the

cooperation of employees and enabled the Department to take advantage of employees' suggestions.

Methods were adopted during the year to speed up the long range project of preparing job specifications. Collection, compilation and analysis of wage data became a heavier task as a result of changing economic conditions. It became necessary to place additional time and emphasis on salary administration, hours of work, and night differentials.

Such services as health counseling, the maintenace of emergency rooms or first-aid stations and Employee Safety program received a maximum of attention by a limited staff. In cooperation with the National Safety Council, the Department Safety Council devised a long term safety program which included the permanent establishment by Presidential proclamation of National Farm Safety Week.

Through its employee relations and services program the Office of Personnel encouraged and assisted employees with such problems as housing, transportation, and child care. At the same time it managed and encouraged war bond drives, blood donor campaigns, and other related activities.

The Department's personnel administrative people and the Civil Service Commission facilitated the postwar return to regular Civil Service methods of recruitment and employment. Various conditions made this a somewhat difficult problem. All placement work, for example, became more complex. This was a result partly of the return of veterans and civilian employees with reemployment rights and partly of required reduction in the Government's total personnel. Staff reductions in war agencies and other Government agencies created a rush of applications for places in the Department. In order to handle these and other applicants effectively, and with consideration to the needs of the applicants, the Department has made plans to establish field placement committees as a means of lightening the pressure on the Washington office.

Although the investigations work load remained relatively constant, the emphasis shifted from loyalty and character investigations to suitability investigations of both new and presently employed individuals.

Adjustments during 1946 in the Department's organization complicated the tasks of the Office of Personnel. Certain activities geared to war had to be terminated; others had to be readjusted to peacetime purposes. Among the most important changes was the abolition of the War Food Administration and the creation of the Production and Marketing Administration. Changing program objectives of bureaus within the Department are reflected in the fact that the Office of Personnel gave final approval to 253 organizational changes during the last fiscal year.

THE TASK AHEAD

Developments covered by this report differed from most forecasts. Employment, for example, was practically full, despite demobilization and reduction in the Government's need for commodities. The reconversion lull was slight; indeed, the main urban difficulty was in

getting workers rather than in providing jobs. Also the demand for agricultural products surpassed expectations. As I have said, the full need for food in liberated and ex-enemy countries went far beyond the early estimates; while in the United States high employment at high wages maintained an unprecedented market. All this was in contrast with the fear that peace would cause an economic setback, and make vigorous activity possible only after hesitation and delay. It is as difficult now as it was 12 months ago to see ahead; hence, I shall not offer any specific forecasts for 1947. Nevertheless, one or two general observations may have value.

Sooner or later the United States will have to learn how to keep technology employed without disemploying men. This, of course, is not a new problem; but it has new urgency. Progress in farm technology, shown within the last decade by an increase of one-fifth in crop production per acre and by an increase of one-third in production per farm worker, has a counterpart in industrial technology. Output per man has increased as much in the factory as in the field. Moreover, the industrial *plant* has increased in size. With both agriculture and industry capable of producing vastly more than ever before, machinery and other technical facilities tend to displace manpower unless the market increases. Temporarily, new techniques may eliminate some jobs and necessitate job readjustments. Merely to use technology for labor saving, without knowing how to reemploy the labor saved, heads us into trouble. Conflict between technology and manpower, whereby more use of the one means less use of the other, has been chiefly a threat in the past, soon cured by an expansion of production and markets. But the threat may become an actuality.

Our economy is now so vigorous that some may suppose the problem of fully employing both technology and manpower is solving itself. But we should not assume that. The present rate of industrial employment, with the associated high farm activity, may not last. What should be done is outside the province of this report; but everyone agrees that agriculture has an interest in the matter. Economists have shown that farm and nonfarm prosperity go together; and they have also pointed out that the growth of farm technology, with its saving of labor, requires constantly rising nonfarm employment, so that manpower released from farming may find other work. Currently we have practically full employment in town and country, for technology as well as for manpower; but that does not prove we shall always have it.

Neither industry nor agriculture can slow down the march of its technology for the sake of providing jobs. Any such action would confess failure to solve the real employment problem. Agriculture, as I have shown, cannot go back; lessened efficiency would ruinously increase farm costs and lower farm profits. Undoubtedly the same principle applies in industry, particularly in the lines that must compete for foreign trade. Full employment must give scope for technology and manpower together, without a brake on the use of either. We ought not to be content with anything short of that, much less with a mere choice between efficiency and full employment. We need scope for all our economic powers—those created by science and invention as well as those inherent in manpower and natural resources.

Here and elsewhere this problem is being discussed intensively; statesmen, economists, and others do not think they have the answer.

But a consensus exists with regard to one important point; namely, that full employment for both manpower and technology presupposes *international* action. Self-containment cannot give scope enough. Our farmers especially endorse this principle; they produce more than the United States itself requires and consequently need a world market. Where the United States as a whole stands is evident from what it is doing for world rehabilitation. In dealing in this report with world food conditions, world food relief, commercial farm export trade, and action to spread agricultural science more widely throughout the world, I have had world aspects of farm and nonfarm prosperity in mind. I shall be happy if the facts I have given help in working out the problem.

CLINTON P. ANDERSON,
Secretary of Agriculture.

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